



Motion Picture
TOPICS

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INDEX

	Page
"New Method for the Dry Hypersensitization of Photographic Emulsions," by F. Dersch and H. Durr - - - - -	2
"Paramount Introduces a New Set-Color for Use with Agfa Infra-Red" - - - - -	8
"The Outlook" - - - - -	10
"Problems of Controlling Correct Photographic Reproduction," Part II, by Dr. Herbert Meyer, A.S.C. - - - - -	12
"Filters for Infra-Red Night Photography" - - - - -	15



HAIL COLUMBIA!

Sincere congratulations to the producer, director, cameraman, and laboratory whose mutual co-operation created the picture "Lost Horizon." We feel that this achievement is looked upon by the whole industry as a monument to progress, illustrating the latent possibilities in motion picture production, and awakening in the theater-going public a new consciousness and appreciation of the efforts put forth to provide such entertainment.. . . .

During 1936 Agfa Ansco earnestly endeavored to contribute to the general progress of the photographic industry, not only by improving the quality of its standard products, but also by suggesting and creating several new emulsion types, such as the Infra Red "A" and "B," the 35mm. Reversible Superpan, and the Direct Duplicating film.

The reader will find in this issue supplementary information in regard to the characteristics and application of these emulsions.

In addition, Agfa Ansco has also continued to engage its research chemists in extensive experimental work on various other problems of interest to the photographic industry. Most of this work, naturally, is unknown to the public, as it usually is kept confidential until it reaches the point of results.

One of the outstanding papers presented during the fall meeting of the 1936 S. M. P. E. Convention deals with a new method of hypersensitizing photographic emulsions, which has been discovered and studied by Agfa Ansco scientists. This abstract has created such comment and interest that we feel justified in reprinting it, slightly abbreviated, in this issue.

New Method for the Dry Hypersensitization of Photographic Emulsions^{*}

By F. DERSCH AND H. DURR

SUMMARY.—Hypersensitization by mercury vapor increases the speed of photographic negative emulsions about 50 to 150 per cent, depending upon the emulsions used for the treatment. The important features of this method that make it superior to the well known wet-hypersensitizing methods are:

(1) The film does not have to be put through a bathing process and then dried. (2) The mercury vapors are active also upon tightly wound spools of film, the sensitizing effect being uniformly spread over the whole length (e. g., of a 1000-foot roll of 35-mm. motion picture film). If sufficient time is available for hypersensitizing, the films need not even be removed from their original wrappers, as the mercury vapors diffuse sufficiently through the wrapping material. (3) The increase of sensitivity is general throughout the range of wavelength of light to which the film was originally sensitive. (4) Not only can unexposed film be hypersensitized by this method, but it is also possible to intensify the latent image with mercury vapors. (5) The stability of the film is not permanently affected, although the increase in speed is gradually lost over a period of four weeks of aging. The clearness, however, remains the same, and may even improve somewhat. By a second treatment with mercury vapor the hypersensitization can be renewed in a film that has recovered from previous hypersensitizing.

After the introduction of panchromatic emulsions, methods of increasing the sensitivity of these emulsions by special treatments became generally known by the name of "hypersensitization." These methods were based upon the well-known fact that the sensitivity of photographic films and plates can be increased by bathing them in water or in solutions containing small amounts of ammonia. Later, other solutions were recommended for the purpose; for example, solutions containing small amounts of silver nitrate and hydrogen peroxide, and so on.

^{*} *Journal of S. M. P. E., Feb., 1937.*

The increase of speed attainable with this *wet*-hypersensitizing method, as it might be called, amounts to 100 per cent, more or less, depending upon the type of emulsion used. Emulsions that have been made in the presence of ammonia usually show less increase of speed.

To make the special treatment practicable, for instance, with panchromatic cine negative film, great care had to be observed in manipulating the wet films, and redrying the emulsion carefully was particularly important to the quality of the results. In addition, hypersensitized films always have certain disadvantages, especially with regard to their keeping qualities, which will be discussed later.

With the introduction of the supersensitive types of negative film, interest in these inconvenient, cumbersome, and expensive methods of hypersensitization declined considerably.

Yet, even with the availability of the supersensitive types of panchromatic materials there still exists, and probably always will, a demand for higher sensitivity, if possible without increasing the graininess.

General

Upon investigating the effect of mercury vapor upon photographic emulsions, it was found that the sensitivity of nearly all types of negative emulsions can be considerably increased when dry films or plates are exposed to the action of mercury vapor.

In our original experiments, photographic emulsions upon films and plates were exposed to the action of mercury vapor by placing them into a light-tight container, the bottom of which was covered with a thin layer of metallic mercury. In the container, films and plates were treated for approximately thirty hours, after which the emulsions showed an increase in sensitivity of about 75 to 150 per cent, depending upon the type of emulsion and upon the mercury vapor concentration within the container.

In Fig. 1 the difference of sensitivity between the untreated material and the material hypersensitized by mercury can be seen, and in this particular case is about 75 per cent. It is interesting to note that the characteristic curve of the mercury-hypersensitized emulsion runs almost parallel to the curve of the untreated material. This fact is pertinent because wet-hypersensitized materials usually show a distinctly steeper gradient than the untreated materials, as will be seen in Fig. 2.

In Fig 2 the characteristic curve of the untreated material, A, is plotted together with the curve of the same emulsion treated with mercury vapor, B. The third curve, C, is for the same emulsion again, but hypersensitized by one of the wet-hypersensitizing methods. In this case a small amount of ammonia in distilled water was used as the hypersensitizing solution. In Fig. 2 the wet-hypersensitized emulsion shows a somewhat steeper gradient than either the type emulsion or the emulsion dry-hypersensitized by mercury vapor. This increase of gamma is characteristic of wet-hypersensitizing methods, while the

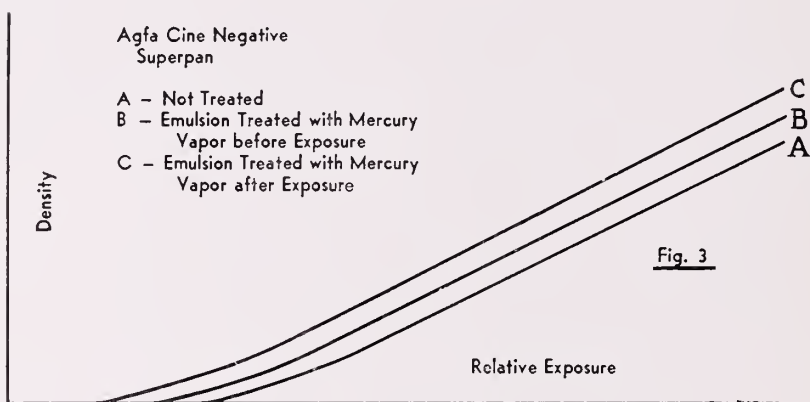
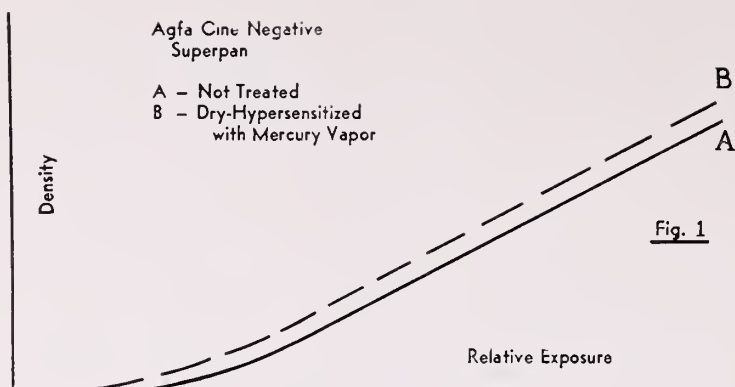


Fig. 1. (Upper) Difference of sensitivity between untreated material and material hypersensitized by mercury.

Fig. 2. (Center) Difference of sensitivity between material treated with mercury vapor and material hypersensitized by a wet-hypersensitizing method.

Fig. 3. (Lower) Effect of mercury hypersensitization before and after exposure.

hypersensitizing by mercury vapor has practically no influence upon the gradient as far as the useful part of the curve is concerned.

The increase in gamma of wet-hypersensitized panchromatic emulsions is largely due to the fact that bathing methods increase the sensitivity of panchromatic emulsions in the yellowish green and red-sensitive portions of the spectrum much more than they do in the blue. The original ratio of sensitivity, for instance, the blue-yellow or blue-red ratio, becomes changed, which means that the filter-factors of the wet-hypersensitized emulsions are different from those of the original emulsion. In this respect the dry-hypersensitized film behaves in a different manner. The mercury does not change the original sensitivity ratio in different wavelength regions; it appears that the increase of sensitivity is proportional throughout the portions of the spectrum to which the emulsion was originally sensitive. This method of dry-hypersensitizing apparently does not change the filter-factors of the original emulsion.

Film and plate emulsions from various manufacturers have been treated with mercury vapor, and no fundamental differences in behavior could be found. There is also no significant difference between the effect of mercury vapor upon ammonia and upon non-ammonia types of emulsions. It has been mentioned already that the action of mercury vapor is rather slow. At normal room temperatures, unwrapped films must be exposed to the vapors for at least twenty-four to thirty hours before the maximum increase of speed is attained. Longer treatment with mercury vapor does not increase the sensitivity to an appreciable extent, but the fog gradually increases. It would, of course, not always be practicable to treat unwrapped and unrolled films for thirty hours in an atmosphere containing mercury vapor. However, it has been found that it is not at all necessary to unwind and unwrap the films completely. The penetration of the mercury vapor into spooled and tightly rolled material is surprisingly uniform and efficient, making the whole process much more practicable and convenient. It is, for instance, sufficient to leave a 1000-ft. roll of motion picture negative film in the original can, and put a few drops of mercury wrapped in porous paper inside the empty space of the film core. The film can must be closed and sealed with tape, and should stand for approximately six to eight days. During this period an increase in speed extending very uniformly throughout the entire 1000-ft. roll can be noticed. The same effect can, of course, be attained with regular rollfilm spools or with spools for the Leica and Contax cameras. In the latter case it is not necessary to open the original cartridge; it is sufficient to put the whole cartridge into a small container containing mercury.

Stability of Dry-Hypersensitizing

The hypersensitizing effected with mercury vapor is not permanent. The speed gradually recedes over a period of about four weeks; after which a more or less stable condition is reached when the sensitivity of the material is somewhat below that of the emulsion before the treatment. However, during the



"HARBOR SCENE"

By H. R. Champlin
Contax Camera—Agfa Superpan—1/100 at F16

aging period, the dry-hypersensitized emulsion remains free from fog. After three to four weeks the fog value of the emulsion is even somewhat lower than the fog value of the original film. It is known that the stability of films or plates that have been hypersensitized by bathing methods is very poor. The fog of the emulsion rapidly increases with age, and materials so treated are usually ruined by excessively high fog in about four weeks. This is another distinct difference in behavior between wet- and dry-hypersensitized materials. After losing their additional sensitivity, dry-hypersensitized emulsions are still in a usable condition. The speed is somewhat less than that of the original untreated film, but the clearness is at least the same or better. There is another advantage. Emulsions that have been treated with mercury vapor, but have not been used before losing the additional sensitivity, can be re-hypersensitized by treatment in the mercury atmosphere a second or even a third time.

As far as could be seen, by comparing treated material with an untreated type, the grain size was not noticeably affected.

Effect of Mercury Vapor Upon the Latent Image

So far only the effect of mercury vapor upon unexposed photographic emulsions has been considered. Theoretical considerations led to the discovery that the effect of mercury vapor upon the latent image is even greater than it is upon the unexposed emulsion. This action may probably be better described by the expression *intensification of the latent image*, as it has been applied to similar processes utilizing hydrogen peroxide.

In Fig. 3, A is the characteristic curve of an untreated emulsion; B is for the same emulsion dry-hypersensitized by mercury before exposure; and C is for the same emulsion, but in this case the mercury vapor treatment took place after exposure—in other words, the latent image has been intensified *after* exposure but *before* development. From the curves it can be seen that the effect of the mercury upon the latent image is distinctly greater than it is upon the unexposed emulsion. However, except for the difference in intensity of the effect, the characteristic behavior is in both cases the same. The characteristic curve of the intensified latent image, as can be seen in Fig. 3, also runs almost parallel to the original characteristic curve. The stability of intensification of the latent image is limited as to the length of time between treatment and development, as is the hypersensitization of the unexposed emulsion as to time between treatment and use.

The treatment of the exposed film with mercury vapor to intensify the latent image can be done exactly in the same manner as has been described for dry hypersensitization. It is, therefore, possible to correct an underexposed picture by treating the undeveloped film with mercury vapor for a certain length of time, provided, of course, underexposure is known or suspected. After the treatment, the film is developed as usual, and will produce a negative similar to one exposed with 100 to 150 per cent more light. Tightly wound rolls in cans can be hypersensitized if sufficient time, generally six to eight days, is allowed. Due to the relatively slow action, good penetration to all the layers of emulsion is achieved, and the effect is more or less uniform throughout the roll.

Practical Applications

Within the scope of this paper it is possible to describe only very briefly how the material should be handled to obtain the best results. As a matter of fact, it would be very difficult to give exact formulas. Fortunately it is not necessary to do so; because of the slowness of the effect, the time of treatment, and the mercury vapor concentration do not have to be very exact. As a general rule, loose and unwrapped material should be treated from 30 to 40 hours at room temperature, while wrapped and spooled materials require treatment for seven to ten days, in a mercury vapor concentration created, for instance, by 0.5 gram of mercury in a 1000-ft. film container. In place of liquid mercury, of course, all compounds, amalgams, such as silver amalgams, and other preparations that emit mercury vapors can be used for dry hypersensitization or for intensifying the latent image.

Paramount Introduces a New Set-Color for Use with Agfa Infra-Red

The majority of recent technical improvements in the Motion Picture Industry have been brought about principally by an urgent need of innovations designed either to expedite production or to relieve some source of difficulty to the technicians. Mutual cooperation between manufacturer and consumer, which is so much in evidence now and which is the outgrowth of this need, has resulted in a sincere effort on the part of both not only to produce a new method or a new material but to intelligently apply it in practice.

Proof of this fact is seen at Paramount Studios where Mr. Ray Wilkinson, progressive Camera Department Chief, first conceived the idea of a more complete utilization of Agfa Ansco's new Type B Infra-Red Negative. Forearmed with a full knowledge of the effect of red filtering with this film type, he conducted a series of tests to determine a color which would not only render the most realistic night effects when photographed in the daytime, but at the same time would not hamper or be a detriment to the use of panchromatic films for day scenes. The resulting color evolved by him, and since adopted by the Studio, has been termed Infra Red Blue-Gray and is, as its name implies, a mixture of these two colors.

This new color technique in combination with Infra Red negatives was first tried out in a picture which was in production at the time, "Internes Can't Take Money," photographed by Mr. Theodore Sparkuhl, A. S. C. Certain night scenes were shot in the daytime, after the entire Brownstone Street had been painted Infra Red Blue, and the results obtained were so convincingly real that the studio is now applying the color, with some variations, to the improved New York Street as well.

Production chiefs are also enthusiastic over the success of this venture as it enables them to schedule pictures with greater facility and eliminate to a large extent the attendant expense and worry of actual night shooting.



"FOG"

By H. R. Champlin
Contax Camera—Agfa Superpan—1/50 at F16

The Outlook

In this column it is our intention to discuss from time to time current problems and future possibilities concerning the development of motion picture technic, with special reference to the part which the Agfa Ansco Corporation by means of its research facilities plays, or intends to take.

We remind the reader of the principal purpose of our publication as stated in the recent introductory article of the first issue, that, is to place special emphasis on the importance of mutual cooperation between the film manufacturer and his experimental aids on one side, and the motion picture producer and his practical experts on the other.

A modern manufacturer knows that it is not sufficient to deliver merchandise of standard quality, but he must also be fully awake to all problems of his prospective customers, and be willing to lend his help in solving them.

It is for this reason that Agfa Ansco sustains the rather expensive maintenance of experimental laboratories which work independently from production, and similarly employs technicians on the West Coast and in the East who serve mainly as impartial interpreters of all matters of interest between the practical field and the factory.

So that this service will be fully utilized, we invite the reader to study this column carefully and to communicate with us if any of the items discussed should interest him particularly.

Photographing Night Effects in Daytime With Overcast Sky or Backlight.

The impression of a true night effect, conceived by viewing photographs taken on Infra-Red film, becomes particularly realistic in all scenes where the sky is a part of the photograph. A clear blue sky is rendered practically black in a print from an Infra-Red negative which has been exposed with a blue-absorbing filter, for the reason that blue sky does not reflect any rays to which this emulsion type after filtering is sensitive.

An overcast sky, however, reflects a substantial amount of red radiation, which makes it impossible to obtain a true night effect with filters in use at present, in case such sky conditions prevail. The same holds true when photographing a blue sky against the sun or with backlight.

This represents an occasional limitation and hampers the possibility of generally applying the technic of photographing night effects in the daytime. There is reason, however, to believe that a special filter combination might be worked out which would make it possible to overcome this obstacle, although practical application might show that the transmission of such a filter is possibly too low to permit sufficient exposure.

If promising results are obtained from experiments now underway, a detailed account of methods, etc., will be published in a future issue.

Panchromatic Negative Emulsion Combining Maximum Speed with Absence of Graininess.

This represents one of the oldest problems of any film manufacturer, and Agfa Ansco has participated with others in attempting to solve it ever since

they became interested in the photographic field.

By natural law, such a combination seems to contradict itself, as the increase in general sensitivity is bound to cause increase in graininess. Additional increase in speed can be obtained by various technical methods, but in every instance one or several of other desirable characteristics, representing important factors of a standard negative material might be lost.

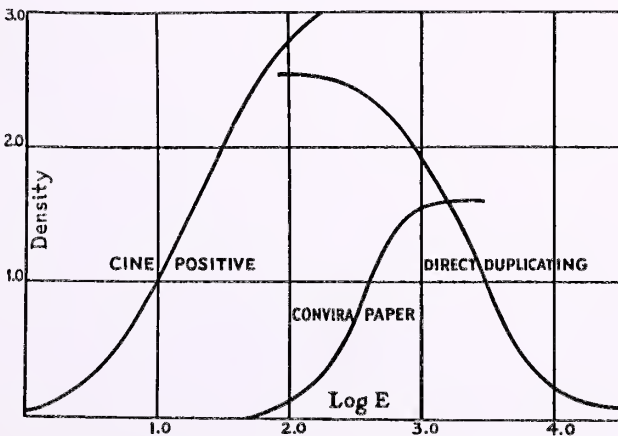
Graininess, however, is not in every case in proportionate relation to the original grain size of an unexposed negative emulsion. Different methods of processing a negative or a print therefrom will result in final prints which vary greatly in graininess, although the negative and positive emulsions used are the same. Graininess, in fact, is rather caused by formation of grain clusters during development than by originally large single grain size.

The raw film manufacturer has contributed a very substantial share in experimentally establishing principles and methods which help to avoid excessive graininess. Agfa Ansco is still engaged in further investigating possible improvements in this direction, realizing that any step forward will be highly beneficial, considering particularly the needs of special effect photography, or of any photographic process in general which applies the duplicating principle.

Direct Duplicating Film.

Within the last year, Agfa Ansco has introduced a completely novel type of film which, when exposed in a camera and normally developed, renders a positive instead of a negative. Similarly, if this film type is used as a printing material, the print will be a negative in case the original has been a negative, or will be a positive when printed from a positive.

With its present speed characteristics, this emulsion is not applicable to motion picture photography, as its sensitivity is only within the range of that of average contact printing papers. (See illustration of characteristic curve).



Characteristic curves showing comparison between direct duplicating film, positive 35 mm. film and Convira paper. .

It can, however, be put to valuable use in the Still Departments for any type of copy work or duplication. Aside from the economic advantage, this film offers in saving time by eliminating operations necessary in the customary course of making duplicates, it should also be considered that this direct method renders results with noticeably finer grain and sharper definition.

A detailed description, including a study of many points of practical and theoretical interest regarding this film type, has been presented by W. Barth at the 1936 spring convention of the S. M. P. E., and was published in the October, 1936, issue of their journal.

Increasing the Life of Motion Picture Projection Prints.

An improvement which Agfa Ansco recently has successfully introduced in their manufacturing process consists of a new method of casting the celluloid base, or film support, on which the emulsion is later coated. While this change might not be noticeable or of direct interest and benefit to the cameramen and laboratory technicians, it has helped to establish a remarkable record for Agfa Ansco products, particularly their 35mm. Positive film among the motion picture film exchanges and theater projectionists.

By this new process, the mechanical characteristics, or what is commonly known as "wear and tear" of the base, has been improved to an unusually large degree, minimizing the hazard of mechanically damaging the finished print, and correspondingly increasing the number of runs in projection machines with high intensity arcs.

Problems of Controlling Correct Photographic Reproduction

By DR. HERBERT MEYER, A. S. C.

PART II

Controlling Methods

Present day photographic technic utilizes many instruments and methods for the purpose of properly controlling most of the above relations.

Objective brightness and negative exposure are determined by light meters.

Speed and gradation of negative and positive materials are analyzed by sensitometric instruments.

Chemical development of both negative and positive materials is controlled by sensitometric methods.

Positive exposure is selected by semi-automatic timing instruments which produce a graduated scale test.



"AT DAWN"

By W. J. Jordan
Agfa Superpan—1/25 at F32

There does not yet, however, exist a practical method or instrument which permit determining of the total visual contrast in the object or its three components, brightness contrast, hue contrast, and saturation contrast in relation to the characteristic of the negative material.

The explanation that, even without this important link, the reproduction of satisfactory and artistically beautiful photographic results is possible lies in the fact that artistic satisfaction created by a photographic reproduction is largely independent of the degree of correct natural reproduction. This is possibly due to the many visual sensation impressions received and recorded in our daily lives and which are all of widely different contrast relations, so much so that regardless of our familiarity with the object our artistic imagination will very likely find the reproduction artistically pleasing no matter how truthfully the original visual contrast has been rendered.

This should not, however, lead to an attitude of satisfaction with our present status, which does not provide a dependable instrument or method to correctly calculate total visual contrast or its components in the object. Regardless of artistic satisfaction, there are many occasions when an accurate knowledge of visual contrast relations would be most helpful, for instance, when pictures are made on location over the length of a full day or of several days which might mean a very noticeable and undesirable change in brightness contrast in the object due to the shifting of the sun or to the natural change in sky conditions.

Before dealing with the possibility of solving the problem of determining visual contrast in relation to photographic reproduction, it is necessary to point attention to the fact that this problem can be considerably simplified if whenever possible the negative exposure level would be raised to a point which would guarantee rendering of all negative densities on the straight-line portion of the characteristic curve. The high speed and wide latitude of present day negative material permits this full exposure under the majority of light conditions. Thus, it is evident that, dealing with linear contrast relations only, the problem is appreciably simplified, at least as far as the negative is concerned. In the positive print, however, it becomes essential to place part of the reproduction in the curved-toe section to permit rendering of sufficient transparency in the highlights for a faithful reproduction of the overall brightness level.

Film Characteristics

The photographic characteristics of positive film being used at present in professional motion picture work are to a large extent standardized. There is little appreciable difference in speed and slope between the competitive types, and this is very gratifying to the laboratory as it permits establishment and maintenance of constant conditions in printing and printing equipment.

The same uniformity, however, does not prevail in the various negative products offered to the market. The reason for this difference is that the principal characteristics required of negative material cannot be perfected in the manufacturing process without the partial sacrifice of other characteristics. Furthermore, with very little exception, a single all-round negative type has been used for general photographic work since the introduction of the Panchromatic Superspeed type, while the variety of problems and tasks to be solved and performed could easily absorb several types of negatives with marked differences in photographic characteristics.

The laboratories processing the negative and print could reasonably object to such variations in negative film, as the existence of such types demand special handling of each type in development, which, of course, would present difficulties in view of machine development. As most laboratories are using single strand machines, it is not impossible to change developing time in order to secure ideal conditions for the rendering of proper contrast in different film types, as this is practically done at present in all laboratories which prefer and employ the "test system" to the "time and temperature system."

(To Be Continued)

Filters for Infra-Red Night Photography

With the kind permission of Mr. Vernon Walker, head of the R. K. O. Special Effects Department, we report below on results obtained by Mr. Walker in a series of recent tests on the new Agfa Infra-Red, type B film.

The test consisted principally of a number of practical camera exposures, employing various blue-absorbing filters to determine the most suitable filter for night effects, considering at the same time the desired degree of contrast required for background process shots.

Mr. Walker prefers a relatively soft negative for this purpose, correctly assuming that the re-photographing necessary in combining projected background with foreground action is comparable to a regular duplicating process, which customarily requires a master print slightly softer than regular dailies or release prints.

The test mentioned revealed that Wratten filter "G" gave the desired results, ideally satisfactory not only as far as the necessary correction is concerned to produce a realistic night effect, but also considering the specific degree of contrast needed for his purpose.

These results are of particular interest as they corroborate findings from experimental studies which our technical division has already made with the older Infra Red, type "A." Mr. Walker also found that any Wratten filter between G and 29F requires practically the same exposure factor (4 to 6) when used in combination with Infra-Red film for night effects in the daytime. There is, however, a noticeable difference in gamma and color contrast, depending upon which one of these filters is used, and it becomes apparent that the contrast increases in ratio to the increase in red transmission of the filter.

Sensitometric measurements, also, confirm this experience, as will be seen from the accompanying list of gamma readings obtained from sensitometric strips made on Agfa Infra-Red, type B, using different filters:

without filter.....	Gamma = .72
with G filter.....	.74
21	.76
23A	.78
25	.79
29F	.80
70	.82

Knowledge of this apparent latitude in contrast should be of real interest and value to every cameraman, because it permits him to more readily control different light conditions. During the introductory period of this film type, we have recommended the exclusive use of the 29F filter for average results, and have purposely failed to make mention of the variety of additional filters available. This was done for the reason that we were anxious to avoid incumber-

ing the cameraman with too much data until he had familiarized himself with this product.

Incidentally, Mr. Walker, in testing the Agfa Infra-Red film, noted the extreme fineness of grain which encouraged him to compare this film type in its adaptability as duplicating negative material. The results, although of no practical consequence, showed the Infra-Red type to be as fine in grain size as orthochromatic emulsions which are used for this purpose.

In connection with the above report, we would like to answer here a question we frequently have been asked by cameramen: "What makes the result of an artificial night shot, photographed in daytime on Infra-Red film, look superior to one photographed on panchromatic type under identical conditions?"

We believe the correct answer to be as follows:

Using a panchromatic type with, for instance, light-red filters such as 23A or 29F will result in an overcorrection of color values, but not sufficiently so to deliver a complete night effect. It, therefore, becomes necessary, in addition to the filter, to underexpose this type material which, however, will produce a distorted negative record, wherein the major part is necessarily registered in the toe-section of the characteristic curve. Correspondingly, the resulting print will be flat and show insufficient separation of density values.

Using an Infra-Red type, such as the new Agfa type B which has an inherent contrast practically equal to that of current panchromatic emulsions, the exposure through a light-red filter already renders a full night correction, so that it is possible to place the negative record in the straight-line portion of the characteristic curve, thus fully preserving the quality of an undistorted reproduction.

A SUGGESTION received from one of our readers expressed the desire that this magazine be provided with some means of binding copies together for future reference. We intend to comply with this suggestion by supplying every reader with a suitable binder at the end of each year.

We are gratefully obliged to Mr. H. R. Champlin for his pictorial contributions to this issue of "Agfa Motion Picture Topics." Mr. Champlin is not only an outstanding photographer, who has quite frequently demonstrated his preference for Agfa Ansco products, but is also widely known for his most active interest and research work in miniature photography and fine-grain development.

AGFA MOTION PICTURE TOPICS

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MOTION PICTURE



MAY
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"LIGHTS AND SHADOWS"

By H. Meyer—Agfa Plenachrome

INDEX

	Page
"Limitations of Infra-Red Motion Picture Photography," by Dr. Herbert Meyer - - - - -	2
"George Crane Takes a Bow" - - - - -	7
"Problems of Controlling Correct Photographic Reproduction," Part III, by Dr. Herbert Meyer, A.S.C. - - - - -	10
"Table for Approximate Comparison of Film Speed Values" - - - - -	16

Limitations of Infra-Red Motion Picture Photography

By DR. HERBERT MEYER

In reviewing a four months' sales experience since Infra-Red Type B negative was first introduced to the industry, we feel it is our duty to point attention to the limitations possessed by this emulsion type in common with special products. This has already been stressed by Mr. Farciot Edouart in his exhaustive contribution to the February issue of this magazine and from which we quote in part as follows:

"It must be clearly and emphatically stated that this new film is by no means a 'Cure All' for all night shots. It should not be considered the final answer to the making of all types of night effect scenes."

At the time of this writing the new Agfa Infra-Red Type B has been used in many major and independent productions and by numerous cameramen, and thus far the vast majority of reports received has been thoroughly satisfactory and enthusiastic as to the quality obtained.

In some instances, however, the results were found to be disappointing, but in every case occasioning such comment it could be proven that the cause of difficulty was the fact that certain limitations prohibiting the general application of this type or any type of film for night photographs in the daytime had been overlooked.

It must be remembered that the photographing of night effects in the daytime was done before Infra-Red sensitive emulsions were introduced to the industry, or at least adapted for actual use. In the past, panchromatic emulsions sensitive to the red end of the spectrum were exclusively used. The introduction of Infra-Red sensitive emulsions, such as Agfa Type A and B, was successful for the reason that these emulsions extended the scope of this phase of motion picture photography due to their higher sensitivity to red and invisible Infra-Red, making possible stronger filtering and, therefore, enhancing the quality previously obtained by the use of panchromatic films. Many of the limitations, however, of photographing night effects in the daytime by the use of red filters and panchromatic film, which were well-known to the cameramen, must be equally respected when applying Infra-Red sensitive emulsions for the same purpose.

It is perhaps most instructive, in order to clearly analyze the present technical status of night photography in the daytime with its merits and limitations, to briefly state the history of its development.

Before Infra-Red emulsions were available and applied, the medium for photographing night effects consisted of panchromatic emulsions in conjunction with deep-red filters, such as the Wratten 70 and 72, or through a combination green-and-red filter, such as Wratten 56 plus 23A. Panchromatic negative

emulsions with normal color balance in the visible red require for this purpose exposure at practically full opening, at least if insufficient auxiliary lighting equipment is not on hand, and even then the average negative is slightly underexposed and must correspondingly be printed in the lower range of the printing scale. The results, therefore, lack sufficient contrast and shadow detail and are quite often characterized by an undesirable grayness in the print, termed, in the language of the cameraman, "mushy."

The first emulsion types sensitized for Infra-Red were still sensitive to green-yellow, orange and visible red and, therefore, also required heavier filters, absorbing light rays between violet-blue and lighter red. They permitted fully exposed negatives because of their increased sensitivity toward the red end of the visible spectrum and the beginning of the Infra-Red band. They were, however, far too contrasty for use in general production shots and particularly for photographing closeups.

Neither the panchromatic nor earlier Infra-Red types would render satisfactory results when photographing in a dead backlight or an overcast sky due to the fact that in both instances red rays reflected from the sky portion which makes it impossible to obtain a negative yielding a black sky in the print, which is the primary essential to an illusion of a night effect.

The latest Type B negative introduced by Agfa Ansco, and which created so much interest, showed a special improvement over former types in the following instances:

The excessive contrast has been reduced to that of commonly available panchromatic types, and the shadow speed has been decidedly increased.

These changes extended the scope of this material for the specific reason that the normal contrast and increased shadow speed permitted application of this type in general production, including any type of closeups. Both improvements also resulted in an increase of latitude over former types and thus supplied a desirable protection for the cameraman and his exposure calculations.

However, this type, naturally, will show the same limitations as mentioned above, and therefore, to obtain desirable results it is absolutely necessary to take them fully into consideration when planning to photograph night effects in the daytime.

Another important improvement represented by both A and B Agfa Infra-Red negative consists of a thoroughly reliable keeping quality. We know of tests made on Infra-Red Type B by a major studio whereby two emulsions of this type, which have been manufactured four months apart were sensitometrically and pictorially compared. The result proved that both emulsions were practically identical in speed and gradation regardless of the difference in age. It will be remembered that former Infra-Red types had to be kept on ice to even render uniform speed and contrast over a period of 60 days from the manufacturing date.

We have found in some cases that cameramen who were accustomed to apply panchromatic film types for photographing night effects in the daytime

proceeded to expose the Infra-Red Type B with a similar technique, assuming that in order to obtain good results they had to underexpose this film. This, naturally, resulted in a print of insufficient contrast and shadow details. The superior quality obtained when using this Infra-Red type is principally achieved by the fact that it is possible to obtain a photographic change from day to night by the sole means of color correction, and that underexposure, with its attendant distortion, is not required.

Another obstacle encountered with Infra-Red sensitive emulsions is caused in some instances by the fact that chlorophyll, present in leaves of plants and trees, reflects Infra-Red radiation, and therefore objects of this nature are liable to be rendered too light in the print. It has been observed that this reflection of Infra-Red, particularly from green spring foliage, causes the appearance of a halo effect and thus creates the impression that the subject is out of focus. This apparent limitation can be counteracted to a great extent by calculating the exposure as short as possible, keeping in mind that over-exposure, naturally, emphasizes the halo effect. Another even better method consists of using lighter filters which will prevent the recording of excessive Infra-Red radiation in comparison to the remainder of visible red rays which are absorbed by using heavy filters.

In the beginning it might appear somewhat difficult for the cameraman to adjust his filtering technique to Infra-Red sensitive emulsions in order to obtain correct exposure and contrast under the various conditions with which he is daily confronted, but it should be considered extremely interesting and worthwhile that he acquire sufficient knowledge to avail himself of all the inherent possibilities this type can offer him.

As we know, the usual impression of scenes observed at night has numerous variations, beginning with the softness of dawn and up to the sparkling brilliance of, say, a full moonlight water scene. To reproduce this scale of contrast satisfactorily to the imagination of the theater-going public requires a full knowledge of the possibilities and limitations of the photographic methods by which the cameraman renders the desirable effect.

Fortunately, a certain basic knowledge sustained by practical experience, rather simply acquired, will serve as a satisfactory guidance for solving most of these problems, particularly that of obtaining the proper contrast for each desired effect. The negative contrast obtained in photographing night effects in the daytime on Infra-Red Type A or B can be varied from a steep to a flat gradation by simply changing from actual Infra-Red filters and deep-red filters, such as 88, 72, and 70, to light-red filters or dark-yellow filters. If filters are used which absorb all visible rays and transmit only Infra-Red radiation, the resulting negative will show a maximum contrast consisting only of intensely pronounced highlights and practically empty shadows. With lighter-red filters, such as the Wratten series between 21 and 29F, the contrast of the resulting negative and corresponding print will gradually decrease. Additional reduction in contrast can be accomplished by using yellow filters such as the G, Minus blue, and



Photographed by Bill Crosby.

Courtesy Republic Studios.

Agfa Superpan—4 P.M.—F:16—1/200 second—Wratten 21 Filter

Aero two, which permit a slight transmission of ultra-violet radiation, thereby diminishing the density between foreground and sky.

As has been stated, proper contrast or the proper relation of brightness differences in the negative and in the finished print is a problem of very first importance in dealing with the quality of night effects.

In addition, there exist a number of points in the technique of photographing night effects in the daytime on this special type material which must be observed in order to avoid disappointing results. In the following we will endeavor to list some of the suggestions and the "don't's" which represent our own experience and that of many cameramen.

1. Acquaint yourself thoroughly with the technique of rendering the desired contrast by means of different filters.
2. The best effects are obtained in cross-light or semi-front light, throwing long shadows.
3. Avoid photographing a dead backlight.
4. Avoid photographing overcast skies and do not attempt to include

heavy cloud effects in night shots as they tend to destroy the illusion of a night sky.

5. Remember that night effects imitating moonlight illumination inspire the impression of coldness and correspondingly more contrast than night effects with artificial light sources such as street lamps, illuminated windows, etc.
6. In some scenes it is of advantage to show detail in the background which would be nearly impossible to obtain when actually photographing at night and to which, therefore, the medium of Infra-Red negative is of particular advantage. In other scenes it will be desirable to subdue background and this automatically requires raising the light level of the foreground, thus permitting a sufficient difference in contrast between background and foreground to enable the emphasis on foreground detail in the print.
7. To avoid overcorrection of the lips when photographing closeups on Infra-Red, a special lip rouge should be applied, which is obtainable at Westmore's Beauty Salon. Other changes in make-up are not required.
8. Using Infra-Red negative for night effects in scenes with large areas of fresh green foliage, one will find that in some instances the effect of overcorrection of green will emphasize the reality of moonlight effects, while in some instances the same overcorrection might tend to create an impression of unnaturalness.
9. Using diffusion for night shots on Infra-Red is permissible for all large closeups. Remember, however, that exaggeration of this effect is definitely detrimental, particularly when lower contrast filters are used and the light conditions lack brilliance.
10. Agfa Infra-Red Type B is developed and processed exactly like panchromatic negative.

Further practical experience in the use of Infra-Red negative for night photography in the daytime will, no doubt, reveal additional valuable information which will be helpful in establishing a definite technique of photographic procedure. The fact that this type of effect-photography is based solely on color correction alone demands a thorough study of the response of this specially sensitized film to objects, light sources and material of different colors and of different Infra-Red reflection and absorption characteristics.

Notwithstanding the excellent reception accorded Agfa Infra-Red Type B by the motion picture industry, a word of caution seems to be timely in order that the impossible be not expected. At the same time, producers, directors, and cameramen should be encouraged to exercise patience in the investigation of the full possibilities this film material offers when technical application is correct. The practical use of this new medium, which was produced as the result of suggestions by prominent studio technicians, undoubtedly has already assisted the industry to more realistic reproductions. Additional study and practical experience will, no doubt, further increase its utilization.

George Crane Takes a Bow

George Crane, formerly assistant to Mr. George Seid, Superintendent of photography at Columbia Studios, has recently joined C. King Charney, Incorporated, in a position of sales and contact man.

Crane has been allied with the motion picture industry for more than twenty years, and during this time has acquired not only a thorough technical knowledge and full understanding of the practical needs of the industry, but has, in addition, established innumerable contacts which, no doubt, will contribute to the success of his new venture.

Below is his response to our request for an article dealing with his experiences with Agfa Ansco motion picture products during his activity in the Laboratory field:

In the past I have quite frequently contemplated the possibility of a personal connection with motion picture film distributing companies. Such a position appealed to me primarily because of the interesting variety of problems and work encountered, and for various reasons I felt a particular preference for Agfa Ansco.

It is easily understood that in effecting a connection of this character my first and perhaps selfish consideration was that the enterprise must show evidence of sound aggressiveness and progress. During my employment with motion picture laboratories, my contacts with technical and sales representatives of the Agfa organization and its distributing company convinced me that Agfa is a thoroughly progressive concern.

I have had numerous opportunities to observe a willingness and sincerity on the part of their technical representatives in aiding the solution of many problems occurring in the technical phase of motion picture production and laboratory procedure. The improvements noticeable in their present Positive and Negative film products, in comparison with the types Agfa offered the market several years ago, is true evidence of the spirit which governs their business activities.

Despite present day perfection in manufacturing technique and the supporting extensive control system maintained by manufacturers, there does not exist such a thing as raw film definitely insured against manufacturing defects. The same applies to all film processing laboratories which, in spite of the most elaborate precautions and accuracy of operation, are always faced with unexpected difficulties due to the complicated nature of the technical procedure and the delicate material involved.

I have always admired the tact and skill of the technical representatives of film manufacturers who are called upon by laboratories to defend the quality of their products. To determine the proper cause of a defect, and to analyze its nature, is an extremely difficult task in many instances. In addition, few realize at the moment the precarious situation involving all kinds of psycho-

logical factors with which these representatives are faced in straightening out laboratory and production trouble caused by a product possibly defective.

In commenting on this subject, I do not mean to say that my experience in the laboratories has brought to light an excessive number of difficulties with Agfa products. The reason I mention this phase of my contacts with raw film manufacturers is that I believe the best opportunity of judging their ability exists when they are faced with particularly difficult situations, arising in the laboratory, which require their full manufacturing knowledge for analysis.

The general advance noted during the past decade in all technical phases of the photographic industry has brought about a status of near perfection to emulsion qualities of motion picture photographic materials, which renders it difficult for a new concern to successfully introduce its products competitively with already existing film. Naturally, to induce a producer or a responsible technician to switch to a different manufacturing brand can only be accomplished by convincing him that the new product has special merit and qualifications which justify the change.

The local representatives of film manufacturers also have the responsible task of guiding their factories in order that certain qualities will be incorporated in their products so that they may be sold on the basis of possessing special outstanding characteristics.

During my laboratory experience, I remember witnessing the efforts on the part of Agfa Ansco technical representatives in the introduction of their Superpan negative. At that time the trend of the motion picture raw film manufacturers was decidedly toward creating a negative type of ultimate general speed. Agfa Ansco's representatives, disregarding opinions to the contrary, went firmly on record in maintaining that excessive speed was necessarily causing a shortcoming in other important emulsion characteristics, such as grain structure. In the meantime, this viewpoint has been sustained as correct by many practical experiences, for the name "Agfa Superpan" and "fine grain" became practically synonymous to the cameramen and laboratory technicians. I recall many instances when cameramen and others, viewing daily prints, commented with surprise on the smooth texture of face tones in closeups photographed on Agfa Superpan.

In connection with this subject, it might be well to mention that the cameraman is rarely aware of how graininess might affect the technical quality of his finished picture due to the many lap dissolves and other effects produced by duplication and inevitably involved in every final release print.

At present Agfa Superpan has reached a degree of shadow speed and general sensitivity fully equal to competitive material without appreciable loss of its fine grain characteristics.

In closing, I want to take this opportunity to express my sincere gratitude to Mr. George Seid for whom I had the privilege to work for the last two years. I modestly say that his fundamental technical ability, thoroughness and practical experience has helped me invaluablely to widen my own knowledge.



"WHEN DAY IS DONE"

By H. Meyer—Agfa Plenachrome

Problems of Controlling Correct Photographic Reproduction

By DR. H. MEYER, A. S. C.

PART III

The consistency of the negative developer is checked and kept constant by gamma control, and in Hollywood laboratories this gamma value has been generally set at approximately .68 plus/minus .05.

"Time and Temperature" versus "Test System"

The two developing systems referred to in the above are based on two different principles for controlling photographic reproduction of visual contrast as far as the negative processing is concerned.

In the "test system," negative tests exposed by the cameraman at the start of every scene which entails a changed lighting condition, are developed at an average standard time, and from a visual examination of each test the developing time which will render the best possible contrast and density in the corresponding actual negative scene is determined. This method, therefore, undertakes to keep negative contrast in each scene constant by varying the developing time and the developing gamma correspondingly.

In the "time and temperature system," the principal developing factors, time and temperature, and the developing gamma are kept constant. In this case it is entirely the cameraman's responsibility to control proper reproduction of contrast and brightness level by his lighting technic.

Theoretically, it should stand without argument that the "test system" be given unanimous preference in view of the additional help it offers to correct mistakes made by the cameraman in calculating exposure and lighting effects, which were, no doubt, made possible by the absence of proper methods or instruments for determining all existing relations between visual contrast and negative characteristics.

The decision in favor or against either of the two systems, however, is influenced by many practical factors, the discussion of which is not within the scope of this article.

Negative Types

While all laboratories, regardless of the developing system adopted, are accustomed to relying upon negative solution control with a fixed gamma value which is a characteristic, of course, of the film type used in connection with these control tests, it is frequently noticed that this procedure tends to form a habit which may unjustly become a reason for condemning film types differing in gamma from that of the film used for these control tests. This is particularly true of laboratories employing the "time and temperature system" when a difference in gamma is noticed while testing a new product against the control-test film type, it seems to upset the principle of consistency of developing time or speed so essential for this system of development. It has recently been prov-

en, however, that adapting the developing speed to the inherent gamma-time characteristic of a new film type, like Super X for instance, is not impossible for either of the two systems, and the initial difficulty encountered is rewarded, when overcome, with gratifying results.

On the other hand, there is equally no reason why negative types, which sensitometrically show a reasonably higher gamma than .68 when developed at standard machine speed, should be rejected. The scale of contrast variations, existing either in outdoor lighting conditions or produced artificially by indoor lighting, varies to such an extent above and below medium contrast that there are many cases in which, due to low contrast in an object, a reasonably higher gamma characteristic of a negative film type might be advantageous, while in other cases where high contrast prevails in the object a reasonably lower inherent gamma characteristic will be found to render better results.

This, of course, is only true when speaking of that part of photographic reproduction where a distortion of brightness relation or contrast is desired, and not where the task consists of photographically reproducing the correct visual brightness in the object.

In general the negative type with a higher gamma characteristic for a fixed developing formula has obviously more practical latitude in development than a type with lower gamma infinity, provided the higher gamma infinity is not accompanied by too much lack in shadow speed. It is always possible to lower the gamma by shortening the developing time and increasing the exposure or shadow lighting, while it is not possible to raise the gamma value over that inherently characteristic for the given type, at least not without an objectionable increase in grain.

Sensitivity

One important characteristic of the negative material is its sensitivity to light or radiation. This sensitivity is usually classified in:

- a. general or blue sensitivity, referring to the original sensitivity of the silver bromide to radiation of shorter wave lengths, and
- b. color sensitivity, referring to additional sensitivity of sensitized silver bromide to radiation of longer wave lengths.

When comparing sensitivity of different negative types by either regular pictorial exposure tests or by sensitometric methods, a distinction between the two components is usually not made and the results then refer to overall sensitivity only.

Correct determination of overall sensitivity should always be made by developing the test types in question to identical gamma values. In case this is neglected and the gamma values are different, the comparative speed figure will change its value with every density step. When the different types are developed to identical gamma values, the speed relation is constant over the entire range of the straight-line portion and the only possible variation of this speed relation that might be encountered is where the extension and the shape of the curved parts vary.

For practical reasons it is, therefore, advisable, when making comparative tests of overall sensitivity, to distinguish between a speed figure relative to a speed comparison of the straight-line portion measured for equal gamma values, and a speed figure relative to the speed comparison of the curved portion which practically takes into consideration the toe section only and which, therefore, is identical to a combination of threshold and shadow speed.

An additional way of expressing speed comparisons of negative types which is commonly practiced, is that of indirectly calculating negative speed from the printer lights required to give a normal print of each negative. As the printer light in general is selected with the intention of giving the print sufficient detail in the high lights, this method of speed calculation refers principally to speed comparison for high negative density portions.

Straight Line Portion

Another characteristic important in the consideration of our problems is the latitude of the negative material expressed by the extension of the straight-line portion. Normally it should be assumed that the farther the straight-line portion extends towards the upper end of the characteristic curve, the better it should be regarded in view of the protection it offers against wrong calculation of exposure. In practice, however, it will be found that the laboratories quite often prefer a negative type with a relatively low shoulder break. The reason for this is that the exposure range of the standard Bell & Howell printer with 22 printer lights has a rather limited latitude, and that, therefore, naturally the danger of encountering highlights of unprintable high density is emphasized in cases where negative types are used with high shoulder breaks. The new automatic Bell & Howell printer has an increased range of printer lights which in itself should be considered a needed improvement and a step forward.

Color Sensitivity

In dealing with the subject of color sensitivity of photographic emulsions in relation to visual sensitivity, we have entered the most complex phase of our problem.

At present four types of photographic emulsions are in practical use which are distinguished by different color sensitivity. They are as follows:

Color Blind Emulsion.

To this group belong emulsions which are only responsive to blue, violet and ultra-violet. They are represented in practice by Positive film and Sound Recording film.

Orthochromatic Emulsion.

In addition to the original blue sensitivity, which is an attribute of all Silver Bromide emulsions, this type is sensitive to the yellow-green range of radiation. Its practical application in the 35mm motion picture field is rather limited at present as it is only used for reproduction of dupe negatives.



"HOME OF REPUBLIC STUDIOS"

Photographed by Joe Walters
Agfa Superpan

Panchromatic Emulsion.

This type responds to practically all wave lengths within the visible range of radiation and extends its sensitivity even further towards red and naturally, also, into ultra-violet range. It is the type generally used for picture negative production.

Infra-Red Emulsion.

This type, in addition to the original blue sensitivity of the Silver Bromide, is sensitized for visible dark red and extends its sensitivity more or less into the invisible range of Infra-Red radiation. It is used in scientific work such as astronomical photography, special effects, particularly artificial night scenes, aerial photography, cloud effects, and long distance shots where aerial haze prevents registration on other types of emulsions.

The spectral sensitivity curve of a photographic emulsion is commonly determined by means of a spectrograph. This instrument permits only relative judgment or comparison of color sensitivity, and the results obtained might be of very little practical value.

In practice, the color sensitivity is usually tested by actual reproduction of colored objects in conjunction with the use of light filters.

Referring to the discussion of the relation between color sensitivity of photographic emulsions and visual sensitivity, it might be well to first refresh the mind of the reader on some of the fundamentals and terminology of color.

Visibility Curve and Spectral Sensitivity Curve of Photographic Emulsions

The visibility curve represents the relation between visual sensation and wave length. It is measured in brilliance units which are plotted for all wave lengths creating a visual sensation upon the retina of the eye. The shape and maximum of this curve changes and shifts to a certain extent with any change of the brightness level or intensity at which the readings of the brilliance units are made. For an average brightness level of a non-selective light source (white light), the maximum brilliance lies at 556 mu (yellow-green), decreasing rapidly towards longer and shorter wave lengths and becoming only 1% of the maximum value at 430 mu (violet) and 690 mu (dark red).

The spectral sensitivity curve of any photographic emulsion differs widely from the white light visibility curve, even when considering the best color corrected type, represented by Panchromatic film. The visibility curve resulting from certain selective light sources such as Mazda light, comes much closer in shape to that of the spectral sensitivity curve of the Panchromatic type, which is one of the reasons why corrective light filters are not in need when photographing indoor sets with Mazda light on Panchromatic film.

Visual Sensation

The total visual sensation can be composed of three factors, brilliance, hue, and saturation.

Brilliance is that attribute of any color which makes it comparable to some member of the series of grays.

Hue is an attribute of certain colors by which they differ characteristically from a gray of the same brilliance, and which permits them to be classed as reddish, yellowish, greenish, or bluish, etc.

Saturation is that attribute of all colors possessing a hue which determines the degree of difference from a gray of the same brilliance.

According to these definitions,* two groups of colors have to be distinguished, one of which represents the non-selective or neutral type and includes all grays between black and white. These colors are hueless and differ from each other only by the brilliance factor.

The other group includes all selective colors, which in addition to being distinguishable by the brilliance factor, create a sensation of hue and saturation. Hue is the qualitative attribute, which distinguishes this color from a non-selective gray of equal brilliance, while saturation is the quantitative attribute expressing the magnitude of the difference between a selective color producing a sensation of hue and a hueless color.

Absorption, Reflection and Transmission

Any natural object is visible by virtue of the incident radiation which it transmits or reflects. Any object that transmits or reflects all wave lengths of

* (See transactions of the Society of Motion Picture Engineers, volume 10, No. 27, Page 135 and following pages).

visible radiation in equal proportion belongs to the group of neutral or non-selectively colored objects, such as gray, white or black, depending solely upon the extent to which they reflect the incident radiation.

All objects which absorb certain wave lengths of the incident radiation to a greater extent than others are selective absorbers. Radiation, which is reflected or transmitted by such objects is different in spectral composition from that which was incident thereon.

The color which an object appears to have depends, therefore, on two factors, its absorbing characteristics and the spectral composition of the incident radiation.

Most of the natural colored objects are of the reflecting type with selective absorption. Consequently, the vast variety of pigments and dyes and their spectral absorption curves are of vital importance to the photographer.

Objects of the transmitting type with selective absorption are best known to the photographer in the form of color filters which are used to selectively absorb or transmit certain portions of the radiation reflected by the object being photographed.

The absorption curves of pigments are in general characterized by a more or less gradual cut off in comparison to those of transmitting objects, such as color filters, which must show a relatively sharp cut off.

Luminosity Curve and Photicity Curve

The ordinates of the visibility curve as previously explained consist of brilliance units. When multiplying these ordinates with those of the spectral reflection curve for any given selective absorber (such as a pigment for instance), and plotting this product against wave length, the luminosity curve is obtained. The area inclosed by this curve indicates the relative brightness of this object for a given light source.

Similarly when multiplying the ordinates of the spectral sensitivity curve for a photographic emulsion with the ordinates of the spectral reflection curve of any object and plotting this product against wave length, we obtain a curve which is known as the photicity curve.

The area inclosed by this curve is proportional to the photographic brightness of the object considered.

These few fundamentals of color should be studied and understood by anyone who concerns himself with the problem of correct photographic reproduction.

The solution of this problem, as was previously stated, consists of rendering brightness and brightness differences or contrast in the final print identical to that conceived by the eye from the natural object.

In practice it will be found that an additional problem of equal importance exists which requires deliberate distortion or a deviation from correct reproduction in order to secure certain desired effects.

TABLE FOR APPROXIMATE COMPARISON OF FILM SPEED VALUES

Weston	H & D	Scheiner*	DIN*	Relative Sensitivity
4	150	15	6/10	1
5	189	16	7/10	1.2
6	238	17	8/10	1.5
8	300	18	9/10	2
10	378	19	10/10	2.4
12	476	20	11/10	3
16	600	21	12/10	4
20	756	22	13/10	4.8
24	952	23	14/10	6
32	1200	24	15/10	8
40	1512	25	16/10	9.6
50	1904	26	17/10	12
64	2400	27	18/10	16

*NOTE:—Scheiner and DIN ratings increase by three units when the sensitivity of the film doubles. H & D ratings and Weston speeds are multiplied by 2 when the sensitivity of the film is doubled.

The Agfa Ansco Corporation wishes to announce that ground has been broken for the erection of a new two-story office and storage building to be located at Cole Avenue and Santa Monica Boulevard in Hollywood.

The new quarters will not only provide larger film storage space, enabling more efficient servicing of customers, but will also permit more complete research facilities. The entire second floor will be occupied by the offices of C. King Charney, Inc., Agfa Ansco Distributors.

Property and building represent a substantial investment which indicates the determination of this Company to manufacture and market only the finest of Motion Picture film material.

In anticipation of the Spring convention of the Society of Motion Picture Engineers, which will be held in Hollywood from May 24th to 28th inclusive, Agfa Motion Picture Topics wishes to extend a sincere welcome to all visitors and delegates.

The whole industry looks upon this Society in just admiration for its unselfish efforts toward general technical progress and high quality standardization.

Agfa Ansco Corporation will participate with a contribution of several technical papers.

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Editor, H. Meyer

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. . . can justly be considered the most important factors contributing to beauty and certainty of photographic results. BOTH are characteristics represented in unexcelled perfection by

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MOTION PICTURE



JUNE-JULY
1937



By DR. ERNST SCHWARZ

INDEX

	Page
The New Agfacolor Process, by Professor Dr. J. Eggert - - - - -	2
Problems of Controlling Correct Photographic Reproduction	
By Dr. Herbert Meyer, A. S. C. - - - - -	12

The New Agfacolor Process

By PROF., DR. J. EGGERT

It is well known to those interested in the various phases of photography that through the entire history of the Art there has been a constant endeavor to reproduce pictures in color. As long ago as 1850 when the first-known method was evolved, attempts were made to produce a medium or system by which reproductions would be rendered in natural color.

The introduction and success of motion pictures gave added impetus to this search, and many ideas have been brought forth attempting the solution of this problem. Most of these methods are well-known to the average photographer and need no description here.

At present the most successful are the so-called subtractive systems which require no additional equipment when viewing, but are still complex in structure and involve a critical and expensive technique to produce. It would seem, after reviewing these present methods, that an ideal medium would be a multicoated film in which each layer would be sensitized to one of the primary colors and would, after exposure, be easily and economically processed.

The following article is a translation from an original paper dealing with the new Agfacolor process, and is published here as an authoritative answer to the many inquiries received regarding this new method.

The film, as described below, is not as yet available to the American market, and we are unable to say at this time when it will be available. Production problems in this connection are now being investigated and an announcement will be made when the product is marketed.

(Editor's Note)

In order to avoid the difficulties involved in making three separate color negatives by means of primary filters, it is necessary to use a film on which three separate sensitive emulsions have been coated—the first being sensitive to blue, the second to green, and the third to red. If suitable emulsions are chosen and coated in this manner, a film is obtained which is similar to the "Tri-pack" material, except that the emulsions are not separated but are coated on a single strip of celluloid.

The first step—that of exposure—can be carried out immediately with such a film, for each emulsion layer will behave as if it were a separate negative under an appropriate filter; and if the entire film is developed and reversed to a positive image, each emulsion layer will register a suitable positive image for color formation. Thus, the top emulsion layer will render a blue-color-separation positive, for this layer was only sensitive to blue. Correspondingly, the two

other emulsion layers will render color-separation positives in accordance with their original color sensitivity.

In the further course of such a process, these positive, silver images must now be replaced in the respective complementary order by colored images of blue-green, magenta, and yellow. The black and white positive from the blue-sensitive emulsion layer must be colored yellow; the positive image from the green-sensitive emulsion, magenta; and the image from the red-sensitive emulsion, blue-green. If these changes can be made, then the problem is solved as far as basic principles are concerned.

Many years ago Dr. Fischer of the "Neue Photographische Gesellschaft" in Berlin was experimenting with certain substances which could be used to produce a dye in a photographic emulsion during development by a chemical process known as "coupling." Proceeding from earlier observations of Holmka, he added certain colorless chemicals to a developer which formed a dye in the gelatine emulsion during development by "coupling" with oxidation products of the developing agents. The dye was formed only where silver was deposited in the emulsion.

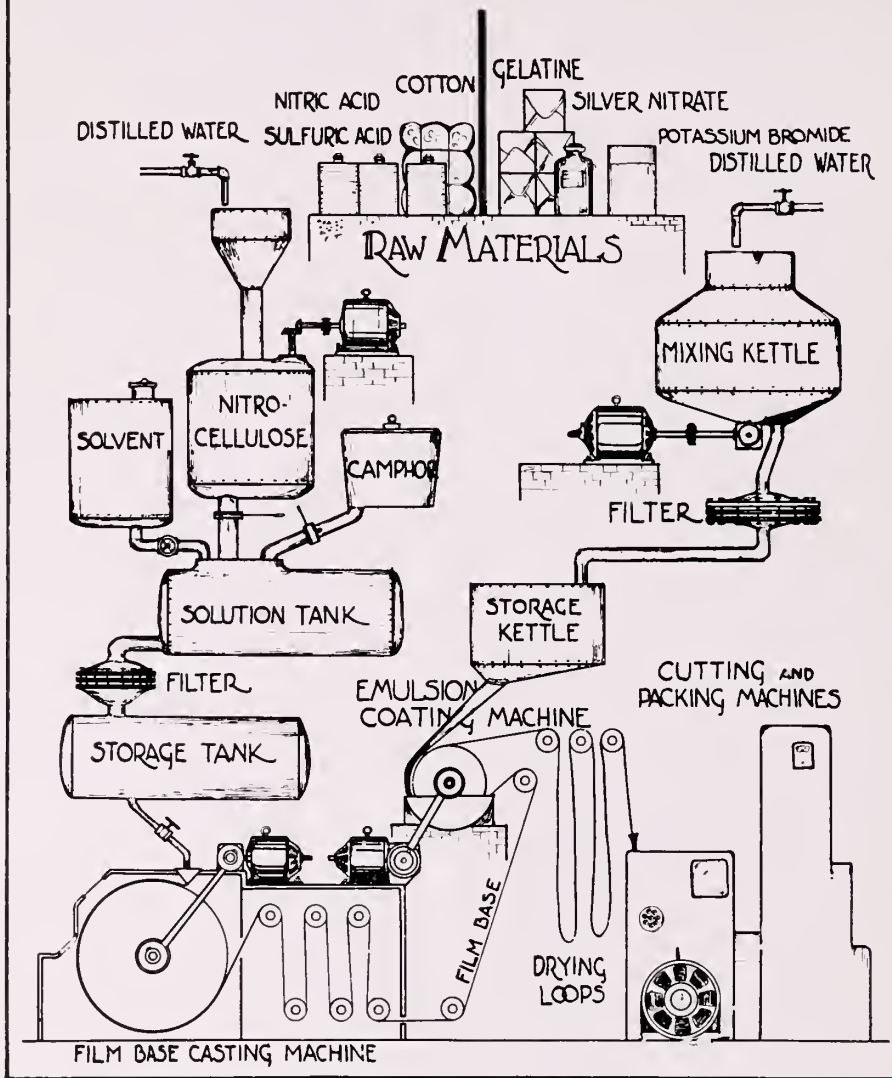
Next, Dr. Fischer found three different substances which, when added to the developer, possessed the properties of producing, in developing the latent image, one of the respective subtractive primary colors, although of course, still quite imperfect. The patents which he took out in 1911 and 1912 to cover this process of dye-coupling during development have since expired, and he was not successful in solving his problem completely for practical use, although he made a fine start toward such a solution.

In principle the color development of the three-emulsion layer film is possible, as has been already mentioned, but the practical solution of this problem offers considerable difficulties. A large number of very exact operations must be performed while processing the film: first, the three emulsion layers must be given a blue-green development; next, the dye in the two upper layers must be removed without affecting the bottom layer; then, the two upper layers must be given a magenta development and the upper layer has to be bleached without affecting the second layer; finally, the top layer must be given a yellow development.

It will be noted that apart from the complexity of the treatment involved, a new developer must be used for each color development and each developer must contain the correct proportion of the substances required to produce the color.

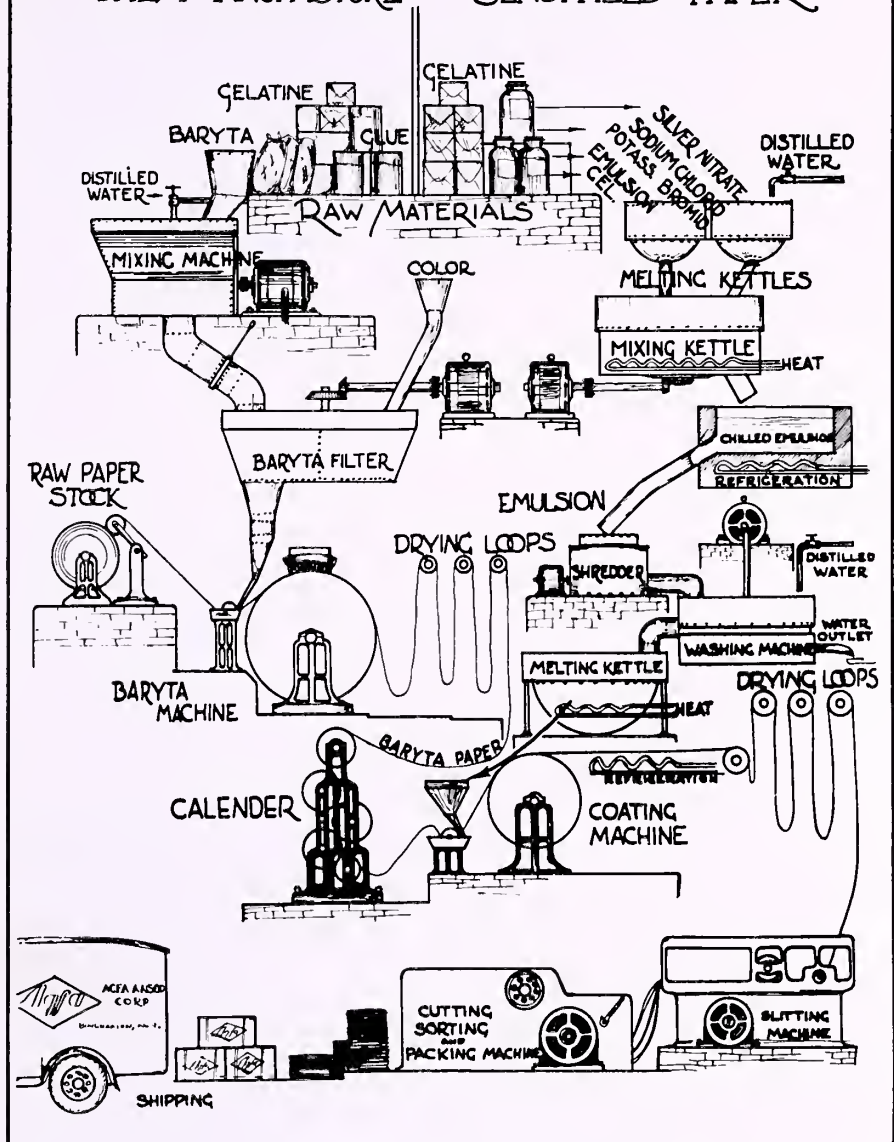
It would thus seem that although this method can render excellent results when undertaken by a skilled staff using special mechanical equipment in processing the film, the amateur and photographic dealer are not in a position to do this work. If it is desired that the method of processing be more practical and simpler, then it is necessary to arrange the process in such a way that the developer used produces three dye images simultaneously, one in each layer of the film. This, however, is only possible in case each of the three different sub-

THE MANUFACTURE of PHOTOGRAPHIC FILM



The above drawings, illustrating the various steps in the manufacture of photographic film and paper, will give the reader an idea of the complicated processes necessary to place in his hands the materials with which he is so familiar.

THE MANUFACTURE OF SENSITIZED PAPER



stances, Fischer had added to the respective developers, is already embedded in each emulsion layer.

The Agfa Research Laboratories have been working on the solution of this particular problem for quite a number of years. The conditions to be fulfilled were certainly not as simple as they sound from the description given above, and it took a great many experimental coatings before it was possible to coat on a single film three emulsion layers, one on top of each other, each .005 mm. thick, and separated by plain gelatine layers .002 mm. thick. It, also, required a tremendous amount of research to manufacture the chemical components which would produce the subtractive colors of blue-green, magenta, and yellow. These substances are best referred to under the name of "components." They must not affect the sensitivity—and particularly the sensitivity to color—of the emulsion layers in which they are placed, and must have the unusual quality of being sufficiently soluble when added to the emulsion during manufacture, but insoluble during the subsequent wet treatment in processing, so that they would not wander from one layer to another, or even diffuse in the same layer. This clearly presents a problem for the organic chemist. Through collaboration between the scientific and technical staffs of the research laboratories and the manufacturing plant, it was found possible to solve all of these problems, in which work Dr. Willmanns and Dr. Schneider, and a large number of co-workers, rendered signal service.

In general the method of working the new Agfacolor process is as follows:

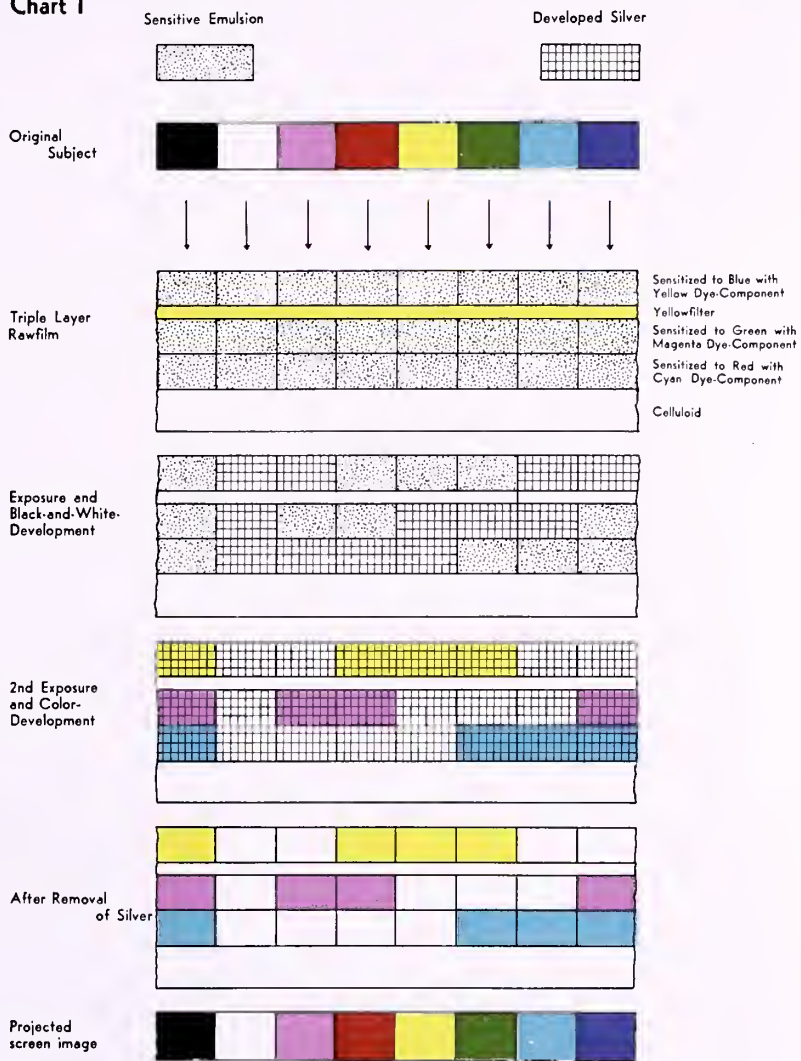
During the exposure in the camera, which requires no special optical equipment or filters, the latent image for each separation negative is formed in the film (see Chart No. 1).

A yellow-dyed gelatine layer between the top (blue-sensitive) emulsion and second (green-yellow sensitive) emulsion layer insures that no blue light reaches the two lower emulsion layers. The three latent images are first developed to negatives simultaneously in an ordinary developing solution. Then, instead of removing the single image or fixing, as in the earlier process, the film is strongly exposed to light and then developed in a solution of the paraphenylenediamine type. In this developer the remainder of the unexposed silver bromide is reduced to silver, while simultaneously a dye image is formed in each layer at the same place wherever the (positive) image appears.

Actually, in addition to metallic silver, an oxide is formed in the emulsion which couples with each "component" present in each emulsion layer, thus forming a dye image. Hereafter it is only necessary to apply a mild oxidizing solution to remove the silver deposit which covers the dye images, and the process is complete. A very simple and practical method thus insures the production of a Positive in natural colors.

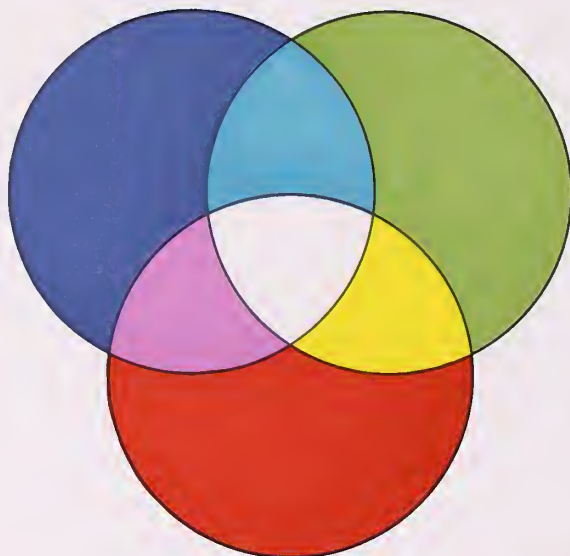
This new Agfacolor Process has the advantage that it might be used with any kind of camera and projected in a normal apparatus so that no expensive accessories will be required by the user. Thus, all difficulties, too, which might

Chart I



The new Agfacolor-Process

Chart II



Additive Primary Colors:



red



green

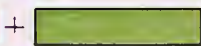


blue

Additive Mixtures:



red



green



yellow



blue



green



cyan



blue



red



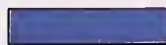
magenta



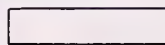
red



green



blue

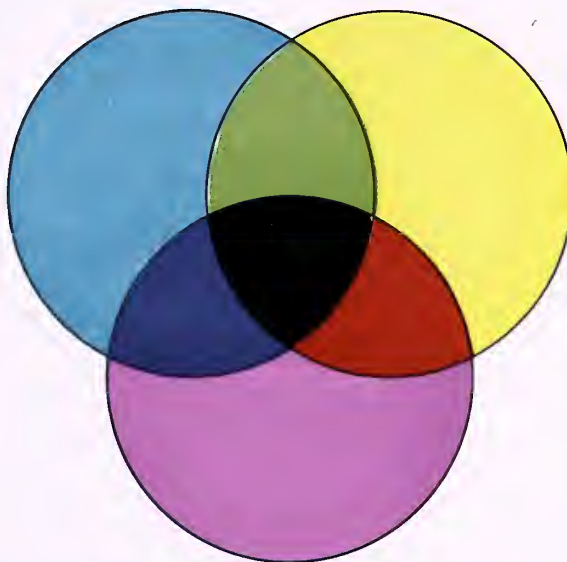


white

Additive Color Synthesis from three
Primary Colors

(Superposition of colored lights)

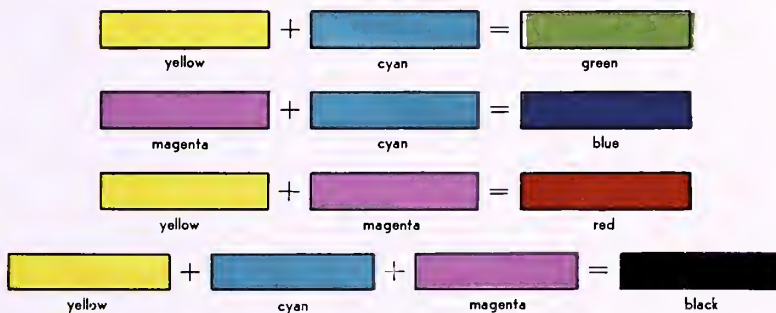
Chart III



Subtractive Primary Colors:



Subtractive Mixtures:



**Subtractive Color Synthesis from three
Primary Colors**

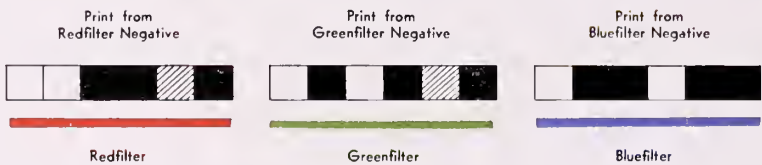
(Superposition of tinted emulsion layers)

Chart IV

Original Subject:

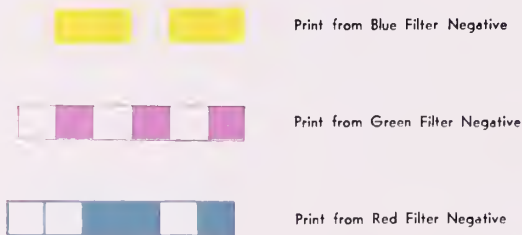


Additive Color Reproduction:



Three separate positive color-separation images (black and white) are projected with white light simultaneously one upon the other through primary filters.

Subtractive Color Reproduction:



Three superimposed color-separation prints, each tinted in the color complementary to the exposing light are projected with white light.

Scheme of Additive and
Subtractive Color Reproduction

be caused where special filters and particular lenses have to be used are avoided. The process is free from fringing, parallax, and diffused focus, the overall thickness of the three emulsion layers being only about that of a normal one-layer film. One may note in particular that the light intensity required for projection is the same as for black and white film.

Furthermore, the grainless character of the image is worthwhile mentioning: there is no silver in the finished film, and the dye image is practically grainless and does not show any clumping. The image has a soft and quiet appearance and can be enlarged to a larger picture size than a black and white monochrome print. The light sensitivity of the material at present is less than that of fast black and white negative film, although it is sufficiently high for all practical purposes.

In sunshine 16 mm. motion pictures may be made using a lens opening of F:4.5 to F:5.6. For still-pictures, sufficient exposure will be obtained with 1/50th to 1/100th of a second at F:3.5. Colored advertising signs can be photographed at night if exposed with a full opening. The speed of this film, therefore, is clearly ample under all normal light conditions.

It is a natural question whether this process can be applied for professional motion pictures photographed in the studio and also for making paper prints in natural colors. Basically speaking, there is apparently no reason why this should not be possible, and work in this direction is already in full progress.

The problem of perfecting this method to deliver commercially acceptable results, naturally, requires additional time and research, but the results thus far achieved justify full hope that the final solution of all practical questions unsolved will be mastered within a reasonable time.

The reader has, no doubt, noticed that this issue of Agfa Motion Picture Topics combines the publication for June and July. This was necessary due to delay in securing color plates illustrating the description, which is contained in this issue, of the new Agfacolor Process.

We believe, however, that information pertaining to this new process was sufficiently interesting to justify the combining of these two issues into one so that the article might be graphically presented and easily understood.

Problems of Controlling Correct Photographic Reproduction

By DR. HERBERT MEYER, A. S. C.

PART IV

From the foregoing articles we might now conclude that the principal difficulties in rendering correct photographic reproduction are caused by the following reasons:

- (a) Total visual contrast in the natural object is composed of three variables, brilliance contrast, color-hue contrast, and color saturation. Contrast in the photographic reproduction can only be rendered by brightness contrast.
- (b) The color sensitivity curve of the eye is far different from that of any negative emulsion.

It is indeed remarkable that the professional cameraman, applying his sense of feeling and intuition, is able to overcome these difficulties regardless of the fact that he is not provided with instruments which would enable him to measure these variables quantitatively, and to adjust exposure and lighting conditions correspondingly. It might also be considered lamentable that the present day technic in this respect is comparable to that of the days when the "negative timer" was forced to judge the printing lights by visual examination of the negative without the aid of the Cinex tester. The question, therefore, arises as to what has been done and could be done to mechanize measurements of these existing differences by means of reliable instruments.

It has been mentioned before that correct photographic reproduction involves two different problems, that of exact reproduction of brightness distribution in the object which is referred to as "Orthochromatic reproduction," and that of deliberately distorted reproduction.

Orthochromatic Reproduction

Orthochromatic reproduction requires balancing of the color sensitivity curve of the negative film material used to that of the eye. This can be done by photographing through a compensating filter. The spectrophotometric transmission curve of such a filter is constructed by dividing the ordinates of the visibility curve by the corresponding ordinates of the photographic sensitivity curve of the negative material and by plotting the values thus obtained against wave length. A filter of this type, in combination with supersensitive Panchromatic emulsions, would be rather prohibitive for practical use due to the magnitude of the exposure factor necessary. For this reason a compromise must be considered and for practical Orthochromatic reproduction filters of a dark yellow or yellow-green color are used, such as Wratten G or Aero #1 and #2, which give sufficient approximation to the theoretical ideal in combination with supersensitive Panchromatic negative film.

Monochromatic Viewing Glasses

In connection with Orthochromatic reproduction, different monochromatic viewing filters are in existence and are widely used by the cameramen. Filters of this kind, like for instance the Wratten yellow filter #90, transmit only a narrow region of the spectrum. In looking through such a filter it is possible to distinguish between a red and a green, but the difference between these colors is so subdued that relative differences in hue or saturation cannot be determined any longer. This enables the observer to judge the object to be photographed by brilliance differences only, and thus to anticipate the results of reproducing total visual contrast by brilliance contrast alone before the exposure is made.

In speaking of black and white reproduction, it will be clear that the problem can only consist of correctly reproducing total visual contrast, which means it is not primarily necessary or even desirable to reproduce correctly one of the three single factors of which total visual contrast is composed. If we consider for instance an object in which brilliance contrast is absent or zero, it will be necessary to reproduce in the negative and print the remaining hue or saturation contrast or both by means of brightness contrast. This means that if different areas in the object are equal in brightness, it is only by destroying this equality that an existing visual contrast due to hue or saturation difference can be correctly registered in the photographic black and white reproduction.

Deliberate Distortion

Assuming now that the different color hues in this case are caused by reflected radiation to which the negative material is equally sensitive, it will be

Typical Sectional View of Research Laboratories of
Agfa Ansco Corporation, Binghamton, New York.



seen that to render hue contrast in spite of this condition, a deliberate distortion has to be made. This is accomplished by the use of light filters, which for this reason are also frequently referred to as contrast filters.

Important in connection with this problem of deliberately distorted reproduction is the correct conception of the rather simple principles underlying the proper direction and the necessary degree of any contemplated distortion. To render a color lighter on the photographic brightness scale of the final reproduction, a filter must be used which selectively transmits the same color. To render a color darker a filter must be used which selectively absorbs this color.

"Warm" and "Cool" Colors

As far as the direction of the distortion is concerned there exist certain physical and psychological laws which make it appear best to render colors of longer wave length lighter than those of shorter wave length. The former include red, orange, yellow and yellow-green, and may be referred to as "warm colors." The latter include blue-green, blue and violet, and are called "cool colors." In case of non-spectral hues, the purples, which reflect red and violet, the ones in which red predominates, are classed with "warm colors," while those in which blue predominates are classed with "cool colors." *

Special Viewing Filter

In addition to the monochromatic viewing filters mentioned above, another type of viewing filter is of interest and is also frequently used in practice. This filter is of a purple tint, thus enhancing red and blue colors, and depressing green-yellow radiation. The spectral transmission curve of such a filter is closest in shape to the spectral sensitivity curve of present Panchromatic supersensitive emulsions, both showing their maximum peaks in red and blue.

Viewing an object through this type of filter will enable one to visually anticipate the effect of the spectral reflection characteristics of the object upon the negative material before exposure. Thus we are able to construct visually for any object what was previously referred to and explained as the photicity curve.

Both types of viewing filters discussed are helpful in many ways for each problem, that of "Orthochromatic reproduction" and deliberately distorted reproduction.

Special Effect Photography

An interesting field in which the application of photographic distortion plays an important part is in the photographing of so-called "effect shots." This includes the many different methods of composite trick photography wherein the combination of foreground action and background is achieved by utilizing the possibilities of color enhancing and depressing filters.

Also, in this category belong photographing through haze and photographically producing night effects made in the daytime. While both of these tasks

* (L. A. Jones, S.M.P.E. Journal, Vol. XI, number 30, page 164 and following.)

(Continued on Page Sixteen)



"STILL LIFE"

By Lewis Ami

can be accomplished quite successfully by using Panchromatic negative emulsions in combination with red filters, there are also available special emulsions which in addition to the blue sensitivity inherent to silver bromide, are sensitized for deep-red and infra-red radiation, and thus make effects possible which cannot be obtained otherwise. (Concluded next issue)

The 1937 Spring Convention of the Society of Motion Picture Engineers recently held in Hollywood is popularly conceded to have been one of the most successful Conventions held so far by the Society. The wide range of technical subjects covered by the papers presented, together with the interesting symposiums on motion picture production held at the various Studios, combined to make the stay of visiting delegates and the attendance of local technicians most instructive and enjoyable.

It was the pleasure of the Agfa Ansco Corporation to present two papers during the technical sessions of the Convention. One dealt with the new "Agfacolor Process" and was read by J. L. Forrest of Binghamton, New York, and the other, a paper describing the "Practical Application of the Agfa Infra-Red Type B Motion Picture Negative to Special Effects Photography," was read by G. W. Hough of the Pacific Coast Technical Division.

Due to the universal interest created by the paper on the new "Agfacolor" a description of this process is contained elsewhere in this issue of Agfa Motion Picture Topics.

With the cooperation of the Agfa Ansco Corporation, a paper entitled "The Objective Quantitative Determination of the Graininess of Photographic Emulsions", was presented by Dr. A. Goetz of the California Institute of Technology, Pasadena, California. As this paper discussed a comparatively new method of measuring and recording this disturbing phase of photography, it aroused great interest and considerable discussion.

Reprints of the above papers from the Journal of the Society of Motion Picture Engineers will be available at the Agfa Ansco Hollywood office as soon as copies can be secured from the East.

AGFA MOTION PICTURE TOPICS

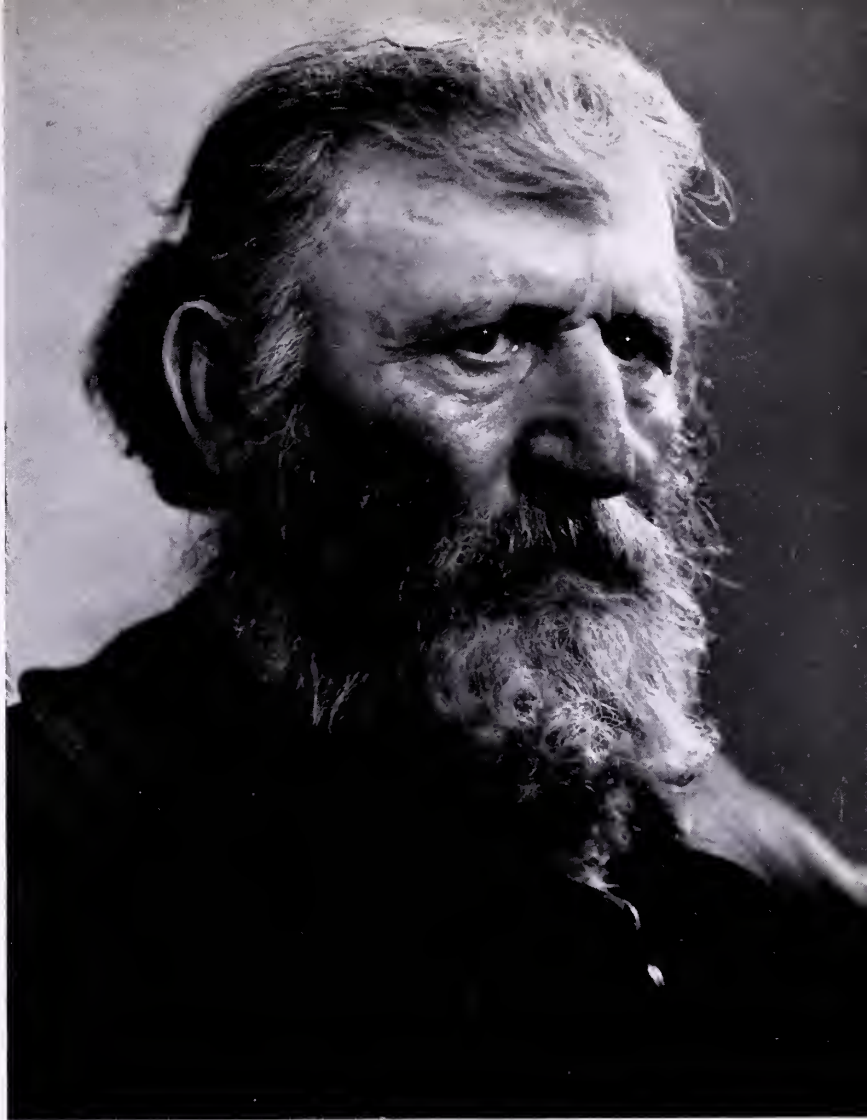
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Motion Picture **TOPICS**

JANUARY - FEBRUARY, 1938



VALLEY OF THE ANCIENTS

Photographed by J. C. MATTHEWS

CONTENTS

	Page
Initiative - - - - -	2
Infra Red vs. Panchromatic Types - - By Dr. Herbert Meyer, A.S.C.	5
Ultra Speed Pan in Newsreel Cinematography - - - - -	10
Quality Control in the Manufacture of Motion Picture Raw Film - - - - - By F. Wing	14
A Faster Film for the Still Man - - - - - By Grant W. Hough	19
Academy Technicians Discuss New Films - - - - -	22
Of Interest to All - - - - -	24

Initiative

THE statement has often been made that the daily work of a motion picture technician consists of achieving the impossible as a matter of routine. The unflinching technical skill and resourcefulness which enable cameramen and others to rise to these demands have become almost axiomatic. But it has not so frequently been pointed out that many of these remarkable achievements have also been due in no small measure to the far-sighted courage and adaptability which enable the leaders of the camera profession to keep themselves abreast of new developments in materials and methods, and to put them to new and perhaps unusual uses when faced with unexpected demands.

That this calls for technical adaptability will not be doubted, though it is possible that in some quarters it will be wondered why courage should be mentioned in the same connection. But when one considers the tremendous responsibility placed upon Hollywood's key production technicians, and the reputations of these men for unflinching technical dependability, it is easier to see why courage is required to apply new and unconventional materials or methods to use on actual production. It is one thing to apply thoroughly known factors to the solution of an unusual problem; it is quite another to stake one's reputation — and possibly several thousand dollars of one's employer's money — upon the performance of new and relatively unfamiliar products.

* * *

To illustrate this point by a concrete example: recently one of the companies of a major studio had an entire night sequence to photograph in the daytime on location. Due to a comparatively short schedule it was determined by the production department that the sequence should be completed in one day's shooting.

After considering the topography of the location and the nature and angles of the scenes to be photographed, the cameraman elected to use Agfa Infra-red Type B negative. This film, having been available for a year, was of course a thoroughly familiar tool.

Shooting proceeded throughout the day in the usual manner. But as darkness came on, it was found that there was still considerable work to be done before the location could be finished.

Faced with the necessity of matching night scenes shot in the daytime with night scenes actually photographed at night, the cameraman immediately switched to the new Agfa Ultra Speed Pan negative and continued shooting, using only one-quarter the amount of booster light that would have been necessary had he been using standard panchromatic material. This was in truth pioneering, for this type of film was introduced so recently that neither tests nor production experience have succeeded in piling up sufficient information about its possibilities and limitations to make it a familiar, commonplace factor.

Upon viewing the rushes the following morning, however, several executives of the company freely expressed their surprise and gratification not only at the excellent matching of conditions accomplished by that cameraman, but also at the tremendous latitude of a film which made it possible to work with so little light. It was also noted with approval that even in employing a negative of such extreme speed the grain size was not at all out of the ordinary. The dollars-and-cents production worth of the new film, which enabled the company to keep its schedule, was also commended.

* * *

There is considerably more to this achievement than merely the laudable, personal success of a distinguished Director of Photography. The Agfa Ansco organization naturally joins in congratulating this Cinematographer for his achievement, the more so since they were primarily responsible for the development of the production type of Infra Red negative which he used, and since they so recently introduced the new Ultra Speed negative.

But beyond these somewhat personal aspects, the incident has a broader significance. We have often expressed the contention that progress is achieved only with complete co-operation between the manufacturer who makes the film, the Cinematographer who uses it, and the producer in whose interest it is used. This incident goes far to prove the truth of this contention. Without the two new materials which were at this Cameraman's command, he could not have scored so notable an artistic and economic success. Without the Cameraman's versatility in applying new materials which he had previously investigated, he could not have effected for his employer this economy, without, at least, some sacrifice of time or screen quality. Without the co-operation of the producer, in giving his Cameraman a free hand in selecting and utilizing whatever materials he thought best, again the achievement would have been impossible.

* * *

To us, the whole incident is especially a graphic example of a technician's using his full knowledge and experience in protecting and co-operating with his employer, to the end that a substantial economy may be accomplished. It is our contention that this particular technician, and many others with the same courage and foresight, will achieve far more lasting personal success and recognition than those others who not only lack ambition but who also adhere to the belief that conventional materials and conventional methods are always good enough.

If men of the caliber of this Cameraman were in the majority, the problem of manufacturers supplying the industry with material and equipment would be greatly simplified.

* * *

All achievements are accomplished primarily by the reconciliation of theory to practice, but as an intermediary there is required a technician of skill, understanding and courage to correlate the two. The problems presented daily to

Cameramen are complex and multiform, and entail a very considerable moral and economic responsibility. Hence a certain conservatism on the part of Cameramen is not only laudable, but is expected. However, when new methods have been demonstrated and proven it is their duty to the industry to be sufficiently skillful and adaptable to meet changing conditions with an informed and receptive mind. The men who are capable of this will, no doubt, long remain as representative members of their craft; and during the years we have all of us seen too often the regrettable fate of those who have been either unable or unwilling to keep abreast of the industry's ever-changing technical conditions.

* * *

To those of us engaged in the technical phases of the industry, then, the strides of science are more than ordinarily real, for they have an intimate, dollars-and-cents bearing on our lives and work. Even a brief review of the history of the industry will confirm this fact. It will readily be agreed that each step forward in box-office popularity was brought about primarily by the creation of some new technique, either in the purely dramatic phases of writing or direction, or in the technical phases through the development of new materials, equipment or methods. But before any of these innovations could bring about its advancement in the quality and popularity of films, it had to be applied — put to practical use by practical film craftsmen. And the men who have in their respective fields withstood these sometimes tremendous changes have been those possessed of sufficient courage to analyze and embrace every worth-while means offered them to improve their production. Now and always, the progress of the industry as a whole is measured by the progressiveness of the individuals who form it.



Infra Red versus Panchromatic Types

By DR. HERBERT MEYER, A.S.C.

UR experience with cameramen using the new Agfa Infra Red type B negative has so far proven that the few disappointments encountered can be definitely traced to a misconception of when Infra Red type B can be successfully applied in making night shots in the daytime and what its actual limitations are.

We do not count herein any case where a cameraman steadfastly gives preference to panchromatic types for the sole reason that he has been accustomed to the use of this type film for a long time and is either afraid to switch to Infra Red or perhaps lacks initiative to bother with a change as long as he believes that results he has so far obtained are "passable."

The latter problem is one which should be of definite concern to the producer whose money finances the production in question. It has been stressed more than once that Infra Red negative as a medium for photographing night effects in the daytime not only enhances the beauty of the results desired, but particularly offers possibilities in economy which cannot be overlooked by any responsible production executive.

Principles of Daylight Night Effects

If it is true, and it has been proven beyond question to be so, that Infra Red type B widens the practical scope of night photography in the daytime, this very fact must mean considerable savings in time and money.

The principles upon which is based the photographic technique of obtaining artificial night effects have neither to do with magic nor are in any way too complicated to be understood and applied by any photographer.

The psychological effect of a night illusion is primarily caused by the rendition of a dark sky. A blue sky in ordinary day photography is reproduced white in the finished print because of the blue sensitivity characteristic of any negative emulsion. To render a blue sky dark, it is only necessary to photograph through a blue-absorbing filter and to print down the negative sufficiently to have the sky portion properly darkened.

Of additional importance is, naturally, the problem of reproducing foreground and action also in tones which suggest an appropriate night effect.

When using a panchromatic type, it is not possible to apply orange or even light-red filters with full exposure as, although they do not transmit blue and

correspondingly darken the sky, they permit green-yellow, yellow, and orange to transmit, thus rendering all other subjects of the picture like a daylight effect. This is directly due to the fact that panchromatic emulsions are fully sensitized and respond to the green-yellow-orange region of the visible spectrum.

It, therefore, becomes necessary either to use deep-red filters, such as Wratten 70 and 72 at full opening because of their low total transmission, or to underexpose when applying a lighter-red filter, such as 29F.

Disadvantages of Underexposure

The underexposure, naturally, helps to render a darker print in general, which in itself closer approximates a "night effect." At the same time, however, this causes the entire negative to be more or less registered in the lower part of the gradation or characteristic curve, resulting in an undesirable distortion of the negative's tonal scale and causing the print to look "flat" and "mushy."

Using Infra Red type B, it is possible to use any filter which absorbs the blue end of the spectrum, as this film type is not sensitized at all for radiation between green (5,200 Angstroem-units) and orange-red (6,600 Angstroem-units). All these filters can be applied with full exposure in securing the night effect and thereby assuring a negative with an undistorted tonal scale and at the same time the desired night effect is made evident not only in the sky portion, but in any additional part of the subject.

For the same reason it becomes equally unnecessary, when photographing on Infra Red type B, to use deep-red filters which have a very low total percentage transmission of only 0.6 (Wratten 70) and 1.0 (Wratten 72) and, therefore, require exposures with full opening.

Filter Transmission

The fact that any filter of the series between 21 and 29, and also including the combination of 23A plus 56 requires the same exposure factor when using Infra Red, which, naturally, means an additional convenience and simplification, is explained by the reason that all these filters have approximately the same transmission for the range of radiation (6,600 Angstroem-units to 7,700 Angstroem-units) for which Infra Red type B is sensitized, with its maximum sensitivity at approximately 7,400 Angstroem-units. In comparing the transmission of these filters for the wave length approximately corresponding to the maximum sensitivity of panchromatic types (6,300 Angstroem-units), noticeable differences will be found which account for different filter factors.

Filter	Percentage Transmission for Wave Length of 6,300 Angstroem-units
21	82.9
23A	76.1
29	50.1
56 plus 23A	5.9



"CENTRAL PARK"
(Agfa Infra-Red)

Photographed by DR. ERNST SCHWARZ

The transmission of filter 72 for the wave length corresponding to the maximum sensitivity of these two film types is 1.51 for panchromatic types (6,300 Angstroem-units) and 11.5 for Infra Red type B (7,400 Angstroem-units).

It has been previously stated and stressed that the application of Infra Red film in obtaining night effects in the daytime has definite limitations. Most of these limitations, however, apply just the same or often more so to the use of panchromatic types for this purpose.

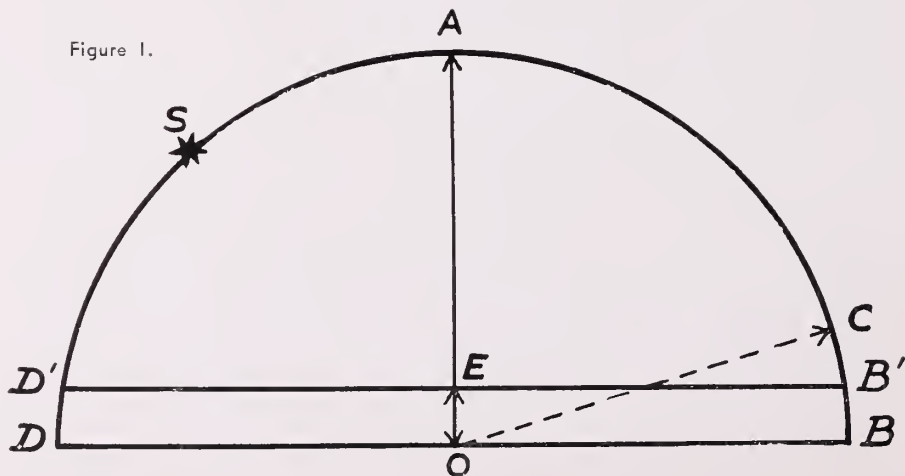
If sky portions are included in a scene, the sky must be clear, otherwise none of the filters named will correct it to a dark rendition. An overcast sky reflects and radiates all colors of the visible spectrum plus Infra Red, and these rays naturally transmit even through a deep-red filter.

The degree of bluishness of a clear sky, also, differs with the position of the sun and depending at what angle to the horizon the sky is observed or photographed.

Sky Analysis

In Fig. 1 this latter phenomenon is explained. It represents a simple drawing of the sky hemisphere with the observer standing at O on the earth level DB. A blue sky does not reflect any radiation from the sun except blue. The atmospheric haze, however, which hovers above the earth level absorbs a considerable amount of blue or shortwave radiation and preferably reflects and refracts radiation of longer wave lengths. The shorter the space, therefore, through which the radiation reflected from the blue sky has to travel to reach the observer or his camera lens, the less blue will be absorbed and the less long-wave radiation reflected by the haze will pass to the lens. In our sketch D' B' represents the upper border of this layer of haze with OE giving its height. S symbolizes the location of the sun. If one photographs against the sky in the direction of OA, this sky portion will be the bluest one and will, therefore, be most effectively darkened in the print when photographing through a blue-absorbing

Figure 1.



filter. Photographing in a horizontal direction from O toward B, the rays reflected from this portion of the sky must pass throughout atmospheric haze, which causes a much greater amount of blue radiation to become lost by absorption and a correspondingly greater amount of long-wave radiation reflected by the haze to reach the lens. When photographing at any angle to the horizon, for instance in the direction from O to C, correspondingly shorter sections of haze have to be travelled through by rays reflected from the sky and correspondingly more blue evades absorption.

It is also quite difficult and in most cases impossible to render a night-sky effect with any film type and filter combination when photographing with back-light.

These are the principal limitations in applying the technique of photographing night effects in the daytime by means of color corrective filters, regardless of whether Infra Red or panchromatic types are used.

In some instances the above-mentioned grayishness of results obtained when using panchromatic types with a light-red filter plus an underexposure might lead to a desired effect: for instance, if actual moonlight night effects are not desired, but a dawn- or twilight-effect is wanted. Infra Red however exposed with appropriate filters would produce such effects just as efficiently as the panchromatic types.

Moonlight Illusion

Naturally, when thinking of an outdoor night effect shot, one imagines, in the majority of cases, "moonlit night effects." The visual illusion of this effect is principally caused through the observance in the projected print of the dark sky, soft but deep shadows and certain carefully spread highlights and catchlights. For this reason a deep shadow in the foreground resulting from a strong cross light is particularly effective. The peculiar effect of Infra Red radiation from green leaves or foliage, and the corresponding photographic rendition on Infra Red film of highlights outlining the shape of trees and tree groups adds a specific beauty which can be overdone, but if properly registered aids the imagination of the observer immensely in realizing a true night effect.

We feel certain that in time every cameraman, director and producer will seriously consider the possibilities offered by the intelligent use of Infra Red type B, particularly the improved quality of photographic results as well as the economic advantages.

A full year's practical experience and testing has truly confirmed and justified the original claim of the manufacturer that this film type is as stable and can be produced in quantities as uniform as any other negative film emulsion. The disappearance of excessive contrast characteristic of former types makes this material applicable to any production use including the most discriminating closeups.



AGFA ULTRA SPEED PAN
5:30 P.M. — f:4.5; 1-20th second

Photographed by CHARLES WAITE

Ultra-Speed Pan in Newsreel Cinematography

A MONTH AGO, when Agfa Ultra-Speed Pan was announced in these columns, it was stated that it was in such heavy demand by the newsreel and other Cinematographers in the East that deliveries in Hollywood would be considerably delayed. It is therefore only natural to inquire what these News Cameramen are doing with the new film, and what results it is giving them.

The answer can be expressed very simply: every American newsreel is using Agfa Ultra Speed Pan, and it is enabling them to film "stories" that could not have been put on the screen with ordinary emulsions. The situation is perhaps best summed up by **Frederic Ullman, Jr.**, Vice-President of Pathe News. He recently said, "The new Agfa fast film makes an important contribution to newsreel coverage. It enables us to photograph scenes which were hitherto not recordable on film. Through its use we will be able to penetrate into remote localities which we could not have photographed without the use of cumbersome lights."

A glance at even a partial list of the outstanding newsreel subjects filmed on Agfa Ultra Speed Pan confirms Mr. Ullman's statement. His own reel, Pathe

News, has within the past few weeks used the new film in "covering" such events as the New York Automobile Show; the Horse Show at Madison Square Garden; New York's Election Night; the Opening Night at the Metropolitan Opera; the Lake Placid Ice Carnival; Interior Ski Jumping at Boston, Mass.; and filming Hockey Games at Madison Square Garden in slow motion, using a camera-speed of 4 times the normal "sound speed."

News of the Day — the former Hearst Metrotone News — has used Ultra Speed Pan in covering many of the same subjects, and in addition has used it to secure "stories" of a Night Flight over New York; the Opening of the recent Special Session of Congress; a Camera Tour of Washington, D.C., released as "The Capitol by Night"; and scenes of the construction of the new Sixth Avenue subway.

Paramount News, Fox Movietone, and the Universal Newsreel have covered these same stories with Ultra Speed Pan: and in addition Universal News has used it in covering at least one important news story in Hollywood — the Christmas Parade, which was embellished with shots of the real "night life" of Hollywood.

But the most telling commentaries on the use of Agfa Ultra Speed Pan in newsreel cinematography are the statements of the men who have actually used it to bring in the news scenes upon which their bread and butter depended. Without exception, they are enthusiastic about the new film. For instance, Pathe News' **Ray Mann** writes us, "Agfa Ultra Speed Pan has not only enabled us to obtain good quality motion pictures under lighting heretofore considered unphotographable, but in many instances has saved much trouble and expense by permitting subjects which previously required extensive lighting to be photographed without any extra lights.

"I feel that the manufacturers of this new film should be given much credit for having furthered, by a long stride, progress in the improvement of the medium with which we work."

Howard Winner, also one of the Pathe News staff, reports, "I have found that Agfa Ultra Speed Negative is far superior to the ordinary film in securing fine quality negative where conditions are such that only ordinary incandescent lighting can be used. It is also very handy for artistic night scenes."

Another Pathe Staff Cinematographer adds his experiences in using the film for filtered exteriors, when Cameraman **Lawrence O'Reilly** tells us, "Agfa Film has played an important part in getting good pictures which under ordinary circumstances it would have been difficult for newsreels to photograph. I find this film to have good general quality. Used with filters, it gives outstanding results. It is very fast in the shadows, and at the same time does not 'burn up' the high-lights."

To **Robert E. Donahue**, the cameraman who "covered" the Madison Square Hockey Games in slow-motion photography for Pathe News, the high sensitivity of Ultra Speed Pan is naturally most important. He says, "The outstanding fea-

ture of the Agfa Ultra Speed negative is its great speed. As an illustration of this speed, I took slow-motion pictures of a hockey game at four times the normal camera-speed, or 360 feet a minute. These pictures were made under the regular lighting at Madison Square Garden, and I secured a normal negative."

Pathe Newsman **William Deeke** points out the economic advantages of newsreel filming with this faster film. He comments, "The Agfa Ultra Speed film makes it possible to photograph when it would be impossible to secure an exposure with ordinary film. In many instances it is possible to photograph interiors without the use of studio lights, thereby saving money."

Movietonews' Head Cameraman **Jack Painter** counts Ultra Speed Pan as important a part of a newsman's outfit as a fast lens. He backs this up by mention of comparative tests of different types of film exposed on the same "story." He writes us, "Agfa Ultra Speed Pan film has been used by the Movietone News Crews under widely varied lighting conditions, and always with excellent results. The greater speed of the Agfa Ultra Speed film gives all lenses an added advantage, and has made possible the photographing of stories heretofore beyond our reach.

"In news photography we frequently make use of slow-motion, and the Ultra Speed stock does much to compensate for the light lost through the increased camera speed.

"Just recently we photographed a Fashion Show, part of which was shot in slow-motion. During these scenes, we used several different types of film for purposes of comparison, and the Ultra Speed unquestionably made the better picture.

"We have also, on occasion, shot sound news stories under exceptionally poor night lighting conditions, using Agfa Ultra Speed film, one Photoflood bulb and an f:2.3 lens. Without this excellent fast film being used it would have been impossible to make this type picture even with an f:1.5 lens.

"Every Movietone News Cameraman now receives his quota of Agfa Ultra Speed Pan film. We consider it just as essential for his work as a fast lens on the camera."

These tributes to the new Agfa Ultra Speed Pan film are naturally most gratifying. We feel, too, that they are more than ordinarily sincere, coming as they do from the leaders of the newsreel camera clan, whose exacting work is traditionally based on the old saying that in news cinematography you can't put excuses — or a film manufacturer's fine slogans — on the screen. In their work, only results count: and we are proud to have the newsreel cinematographers say that Agfa Ultra Speed Pan is giving them results.





Photographed by DR. ERNST SCHWARZ

Quality Control in the Manufacture of Raw Film

By F. WING

Agfa-Ansco Corporation, Binghamton, New York

It is doubtful if any other material is manufactured on a commercial scale under difficulties so numerous and diversified as those encountered in the routine production of highly sensitive photographic film. For here the most delicate chemical reactions and exact physical standards must be maintained with predetermined limits throughout large scale manufacture. There are, of course, many products of the chemist and the maker of biological and pharmaceutical drugs, which are most difficult to prepare, but it must be realized that these products are usually made in small batches, command high prices because of their purity, and can be prepared and purified under the visual observation of the chemist during the process of manufacture.

The film manufacturer, on the other hand, is handicapped because all production operations following the initial steps must be conducted in very subdued light or total darkness, and the little which can be seen during manufacture is useful only in judging physical characteristics of the product, while the all important photographic qualities of film must be determined by actual photographic tests. With these difficulties in mind, one might suppose that the maker of film could rely upon standard testing methods similar to those used in making innumerable other products, where it is common procedure to subject a small sample to specified tests for chemical and physical characteristics with confidence that the result will accurately represent the qualities of remaining material.

Difficulty of Testing Raw Film

Testing methods of this kind have naturally been applied to controlling the manufacture of photographic film wherever possible, and such tests insure uniformity in the constitution of raw materials, emulsions and film base, but the qualities of finished photographic materials are profoundly influenced by variation in physical dimensions, therefore, the testing of representative samples at various stages of manufacture must be supplemented by other tests specially devised to reveal the existence and location in a coating of any possible deviation from established standards.

The average user of photographic film has little or no idea of the methods used in modern large scale production of sensitive materials, and is therefore unlikely to have knowledge of testing methods used to control production. The following description of film testing during manufacture should therefore be of interest to the practical photographer, the cinematographer and the film producer, all of whom directly or indirectly depend upon the efficiency of testing methods to insure quality in their pictures and to minimize production costs.

A special Film Testing Department is the most prominent factor in the system of production control, and though each production department is responsible for inspecting workmanship and testing both the raw and finished materials which it contributes during the film manufacturing process, the Film Testing Department acts as a "bureau of standards" to co-ordinate inspection by the various production departments, and to make sensitometric and practical photographic tests of finished film before it is allowed to leave the factory.

Testing the Film Base

The first step in the manufacture of photographic film is the production of the flexible transparent base, and this material is examined by inspectors as it



Photographed by RAY V. DAVIS

comes from the machines and is wound in rolls. Samples are then taken from strategic points in the roll and subjected to tests with specially designed instruments which determine tensile strength, elasticity and resistance to tearing and bending. The base material, if it is up to standard in every respect, is then ready to be coated with the emulsion (tiny particles of light-sensitive silver bromide suspended in gelatine) which has been prepared in the meantime, coated experimentally, and subjected to the most exacting chemical and sensitometric tests before it has been approved for coating on a large scale.

During the coating operation, film is constantly watched by workers who can almost see in the dark, from long experience working under the barely perceptible illumination permitted. In producing high speed panchromatic materials, the entire coating process must of course be conducted in total darkness and practically no visual inspection is possible at this stage. When coated film has dried, samples are immediately measured for emulsion thickness, while other samples are subjected to sensitometric tests of photographic characteristics. At the same time, samples are sent to the Film Testing Department where they are exposed and developed as a check on cleanliness and photographic quality. If all of these tests indicate that the coated roll is up to standard, it is released for slitting.

Because high speed panchromatic films can only be handled in total darkness, it is necessary to make routine tests according to a special procedure in order to locate and discard any portion of the production which shows irregularities in coating, but positive film, which can be handled under red light, is examined by trained inspectors as it runs through the slitting machines, and it is indeed seldom that any possible irregularity escapes their keen observation.

Perforation of each roll of 35 mm. film is the next operation, and one that requires great precision. For this reason the perforating machines are under the supervision of skilled mechanics, and samples of film from each perforator are run in a special precision projector which shows the perforations in greatly enlarged form on the screen. Any possible unsteadiness is thus instantly detected and the perforator is repaired and tested before further use. At the same time, strips from the ends of rolls of perforated film are developed, and additional samples of film from each perforator are optically measured on a stereo comparator, an instrument accurate to $1/25000$ of an inch, to insure standard pitch and alignment of perforations. As a further precaution, the perforators used for negative materials are checked at frequent intervals by measuring perforated film with the stereo comparator, thus insuring precision and cleanliness in the cutting of individual perforations.

When 35 mm. film has passed all tests for accuracy of width, thickness, edge printing, perforations and other physical characteristics which are measured during production, samples of the film are sent to the Testing Department for sensitometric tests, and special tests to determine resistance to age and other factors which adversely affect unexposed materials during storage. In

addition to these tests, the film is again measured for thickness of base and emulsion, tested for resistance to processing troubles, and examined for clearness following processing under practical conditions.

Resistance to static, which might be encountered under certain laboratory conditions in high speed printing and developing, is tested by a special machine, while gray base negative materials are further checked to assure density and color of the gray base. Specimen film strips from these tests are filed for future use.

At regular intervals, cans of film are picked at random from finished production, opened in daylight, and inspected for packing and for any possible film defects which are visible. Other rolls of finished film are held in stock to be used for reference purposes after the remainder of the production has left the factory. These are subjected to periodic tests, not only throughout the reasonable life of the film, but for an additional period as well, in order to study any changes which may take place in the film with age.

As a final and concluding test at the time of production, samples of negative materials are regularly exposed in a professional motion picture camera under conditions of practical use, and are then processed according to approved film laboratory practice. Prints are made on samples of positive material and these prints are machine developed according to normal laboratory procedure. Finished prints are carefully examined by projection and by slow and painstaking hand rewinding.

As the reader may have guessed by now, the most minute details in the manufacture and testing of photographic film are carefully recorded for future reference, and though unknown to the public, one may say that the private life of a roll of film has been as thoroughly chronicled as that of the famous Dionne quintuplets. For this reason users of photographic materials should always refer to film by the emulsion number whenever it is necessary to discuss technical matters with the manufacturer.

Much effort and research is being directed toward improving both the methods of production and the methods of testing film, in order that the cinematographer may have the best possible materials at his command. To meet problems created by the many new types of film which were unknown a few years ago, modification of the testing procedure has often been necessary, and the newer ultra sensitive panchromatic films are examples of material requiring additional routine tests which were previously unnecessary.

Although the high degree of perfection and uniformity found in modern positive and negative materials is regarded as commonplace by the motion picture industry, a moment's consideration of the unparalleled and elaborate precautions which enter into the routine production of photographic film, should enable one to realize that this perfection is no happy accident, and has only been attained after the most painstaking care in manufacture and the application of every known agency for the elimination of error.



GRAND CENTRAL STATION

Photographed by DR. ERNST SCHWARZ

A Faster Film for the Still Man

By GRANT W. HOUGH

Agfa-Ansco Corporation, Pacific Coast Technical Division

WITH negative materials of such greatly increased speed as Agfa Supreme and Agfa Ultra Speed Pan films available to the cinematographer, the studio "still man" is obviously in need of a comparably fast emulsion upon which to make his stills. This need is now met with the introduction by the Agfa Ansco Corporation of a new and surprisingly fast cut film known as **Agfa Superpan Press**.

This new emulsion has a speed equal to that of the new Ultra Speed Pan motion picture negative film. It is four times greater than the speeds of emulsions heretofore rated as "maximum speed" plates or films, and approximately double the speed of even the new Agfa Supreme motion picture negative film.

This tremendous increase in speed has not, however been secured at any sacrifice of other qualities desirable in a fine film. It must be emphasized that Agfa Superpan Press film is in no sense a hypersensitized emulsion. The increased speed is gained through an entirely new emulsion making technique. Agfa Superpan Press film is not, therefore, limited by the restrictions as to storage, keeping quality, etc., generally applicable to hypersensitized film. Its keeping quality is equal to that of any existing superpan type emulsion, and it may therefore be stored in the usual manner.

Superpan Press film is capable of producing brilliant results when exposure is limited, and will also preserve brilliance if the film is underexposed. Tests made by local photographers have indicated that printable negatives have been secured on the new emulsion within an exposure range of nearly fifteen to one between minimum and maximum exposures (see illustrations).

Color Sensitivity:

Superpan Press film has practically the same color sensitivity as Superpan Portrait film, which is familiar throughout the industry. It is therefore a truly panchromatic emulsion. Its normal high sensitivity to red and orange light make it especially useful under the incandescent lighting used in motion pictures. The new emulsion reacts normally when used with color filters. The daylight exposing factors for several standard filters when used with this new film are as follows:

K-1	.	.	.	.	.	.	.	1.8	23-A	.	.	.	.	.	.	.	3.5
K-2	.	.	.	.	.	.	.	2.0	25-A	.	.	.	.	.	.	.	5.0
Aero 1	.	.	.	.	.	.	.	1.5	F	.	.	.	.	.	.	.	7.0
Aero 2	.	.	.	.	.	.	.	2.0	N.D.	.25	.	.	.	.	.	.	1.8
3-N-5	.	.	.	.	.	.	.	4.0	N.D.	.50	.	.	.	.	.	.	3.1
5-N-5	.	.	.	.	.	.	.	6.0	N.D.	.75	.	.	.	.	.	.	5.6
G	.	.	.	.	.	.	.	2.5	N.D.	1.00	.	.	.	.	.	.	10.0

Due to the extreme speed of the emulsion, still photographers must be



AGFA SUPERPAN PORTRAIT FILM



NEW AGFA SUPERPAN PRESS FILM

Both pictures lit with 500 Watt spotlight. Exposures: 5 seconds at f:128.
Normal development and printing.

cautioned against using Superpan Press film for outdoor exposures unless their cameras are equipped with high-speed shutters.

Darkroom Handling

Superpan Press film requires the same care in darkroom handling as does any high-speed panchromatic film. It is advisable to load, unload and develop this film in total darkness. Tank development is therefore best. Any rapid developer containing sufficient potassium bromide can be used with this film. The Agfa No. 47 Metol-hydroquinone developer is a good, clean working formula which will give maximum film speed and full gradation:

Water (about 125° F.)	3 quarts
Agfa Metol	88 grains
Agfa Sodium Sulphite (anhydrous)	6 ounces
Agfa Sodium Bisulphite	60 grains
Agfa Hydroquinone	1/4 oz. 70 gr.
Agfa Sodium Carbonate (monohydrated)	3/4 oz. 20 gr.
Agfa Potassium Bromide	47 grains
Water to make	1 gallon

This developer need not be diluted for use. Normal development time is 6 to 8 minutes at 65° F., with regular agitation. For softer negatives, a formula such as the Agfa No. 17 Borax developer is excellent. In this, Superpan Press film normally requires from 12 to 14 minutes at 65° F.

Superpan Press film fixes rapidly in any standard fixing bath. The dye of the anti-halation backing is effectively decolorized by the developer, without having any effect on the solution, and leaving the negative normally clear,

unless the final wash water is acid instead of neutral or slightly alkaline. In this case, if the film retains any slight stain, it can be removed by rinsing for two or three minutes in water containing a few drops of ammonia, or in a 5% solution of potassium metabisulphite.

Practical Use

The practical advantages of this film for the use of the motion picture still man will be obvious. Using it on the set, its superior speed will give the still man a much-needed advantage in working with motion picture lightings. In the majority of instances, he will be enabled to reduce the aperture of his lens considerably, thereby gaining better definition and depth of focus more nearly comparable to that given by the cinematographer's shorter-focus lens. He will also be able to use shorter exposures, thereby reducing the danger of moves on the part of the actors.

In addition, the new film opens up a completely new field of genuine action stills. Using ordinary apertures, the speed of Superpan Press film will permit the still man to use exposures fast enough to stop most normal action. With a reasonably silent shutter, such action stills could well be made during rehearsals, without interrupting the action.

When using photoflash globes for normal flash work, the smallest size flash bulb (No. 10) should be used, and the lens set one full stop smaller than usual. The larger globes and stops now considered standard for close flash shots with ordinary films can with Superpan Press film be employed for long shots, and for synchronized speed flashes where high shutter speeds are necessary to arrest fast motion.

The full possibilities which Superpan Press film offers in studio still work can hardly be outlined as yet. These possibilities await the revealing experience of practical still photographers engaged in actual production. Such experience is now being amassed in tests and production use of the new product in several studios, and the results will in due time be reported in these pages. It is certain, however, that this new and surpassingly fast emulsion will enable the studio still man to obtain a new and welcome means of getting his stills more quickly, more easily, and more effectively.

OUR ILLUSTRATIONS

Our illustrations this month include three photographs from the camera of Dr. Ernst Schwarz, President of the Agfa-Ansco Corporation. According to reports reaching us from New York, a larger collection of Dr. Schwarz' recent photographs has been published in book form, under the title "Pictorial America." In common with Dr. Schwarz' many friends throughout the motion picture industry, we await with considerable anticipation the appearance of this volume, which will certainly take a high place among the major photographic works of 1938.

Academy Technicians Discuss New Films

THE Technicians' Branch of the Academy of Motion Picture Arts and Sciences met on the evening of January 19th to witness demonstrations of the latest developments in motion picture raw film stocks. The meeting was held in the Projection Theatre of the Paramount Studios, with Gerald Rackett presiding in the absence of Technicians' Branch Chairman Major Nathan Levinson, who unfortunately was ill.

Outstanding features of this meeting, in addition to papers relating to recent developments in sound recording stocks, were discussions and demonstrations of the Agfa Ansco Corporation's two new motion picture film stocks, Agfa Supreme, and Agfa Ultra Speed Pan.

Dr. Meyer Gives Technical Data

Technical descriptions of the two new films were given in a paper presented by Dr. Herbert Meyer, President of C. King Charney, Inc. Following Dr. Meyer's paper, Wilson Leahy, West Coast Technical Representative of the Agfa Ansco Corporation, presented a brief paper dealing with the practical aspects of using these two new films on production. He accompanied his remarks with the projection of several demonstration reels photographed on the new emulsions. Studio interiors, comparing the new Supreme film exposed at f:4 with conventional Superpan exposed at f:2.3, were shown. Night street scenes photographed at normal apertures and camera-speeds upon the new Ultra Speed Pan were also shown, and proved striking demonstrations of the tremendous speed of this new emulsion.

Production Scenes Shown

Through the courtesy of the Paramount Studio, and Mr. Farciot Edouart, several Transparency Process scenes made on the new Agfa Supreme negative for use in Cecil DeMille's production, "The Buccaneer," and Ernst Lubitsch's production, "Bluebeard's Eighth Wife," were shown.

Through the courtesy of RKO-Radio Pictures and Mr. Vernon L. Walker, several comparative test scenes utilizing Agfa Supreme with the projected background process were shown, while production scenes in which this new film was used in filming dance numbers on a large set for "Radio City Revels," furnished another indication of the advantages offered by this new type of film.

Mr. Leahy commented that while the scenes shown were all that were possible in the limited time allowed by the meeting, there had been many other equally noteworthy scenes made upon the new films in the course of current production. In point of fact, although the new films were only announced in December, before the end of 1937 more than 18 feature productions, made by half a dozen different studios, had utilized either Agfa Supreme or Agfa Ultra Speed Pan negative.



Photographed by E. A. TOBLER

Of Interest to All ---

Glen MacWilliams, A.S.C., returning to Hollywood after six years in London as Chief Cinematographer for the Gaumont-British Studio, was seriously injured in an automobile accident which occurred on January 14th, when Glen's car left the highway near Williams, Arizona. Mrs. MacWilliams, their two daughters and an English maid received minor injuries, while Glen sustained very serious injuries to his back.

MacWilliams is now in the Queen of the Angels Hospital, in Los Angeles, where he hopes his Hollywood friends will visit him. One friend recently showed him the A.S.C.'s weekly list of available Directors of Photography. Glen insisted that his name be placed on the list, with the notation, "Will be available in six months." With spirit like that, Glen may be down, but he is a long way from being out! We extend our sincerest wishes for a speedy recovery, and urge all of Hollywood's camera profession to call upon him.

•

Director William Dieterle is another member of Hollywood's film colony who is to be congratulated on his recovery from serious injuries, likewise sustained in a motor smash. Director Dieterle, however, is reported sufficiently recovered to have left the hospital and returned to work. As we go to press, Dieterle is hard at work for Walter Wanger Productions, directing "The River Is Blue."

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Agfa Ultra Speed Pan is now available in special daylight-loading cartridges for use in miniature cameras, such as the Leica, Contax and others. These cartridges may be obtained from all photographic supply stores. They are not available at the offices of C. King Charney, Incorporated.

At present, **Agfa Supreme** is not as yet available in these miniature-camera loads, though undoubtedly it, too, will eventually be available in this form, as are the other Agfa miniature-camera films, including Agfa Superpan, Agfa Finopan and Agfa Plenachrome.

AGFA MOTION PICTURE TOPICS

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Hollywood 2918

Editor, H. Meyer

C. King Charney, Inc., is not responsible for statements made by authors or for unsolicited manuscripts.

PROVING the ADVANTAGES OF THE NEW



SUPREME and ULTRA SPEED PAN

Major Productions

"Dr. Rhythm" Supreme Negative

Paramount Productions

"The Buccaneer" Supreme Negative

"Big Broadcast of 1938" Supreme Negative

"Bluebeard's Eighth Wife" Supreme Negative

"College Swing" Supreme Negative

"Highway Racketeers" *Ultra Speed Pan*

"Bulldog Drummond's Peril" Supreme Negative

"Dangerous to Know" Supreme Negative

"Romance in the Dark" Supreme Negative

"Stolen Heaven" Supreme Negative

Principal Pictures

"Tarzan's Revenge" Supreme Negative

RKO-Radio Pictures Corp.

"Radio City Revels" Supreme Negative

"The Perfect Alibi" Supreme Negative

"The Joy of Loving" Supreme Negative and *Ultra Speed Pan*

Hal E. Roach Productions

"Swiss Miss" Supreme Negative

20th Century - Fox

"The Baroness and the Butler" Supreme Negative

"Sally, Irene and Mary" *Ultra Speed Pan*

"Alexander's Ragtime Band" *Ultra Speed Pan*

"Shanghai Deadline" *Ultra Speed Pan*

•

AGFA SUPREME and ULTRA SPEED PAN

Made by AGFA - ANSCO CORP., in Binghamton, N.Y.

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HOLLYWOOD

NEW YORK

Agfa

Motion Picture
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WINDOW CLEANER

Photographed by Hilliard B. Swede

CONTENTS

	Page
Timely Topics	2
Four Useful Optical Formulas By Robert Mitchell, Jr.	7
Infra-Red For Dramatic Effects By Charles Ford	13
Problems In the Use of Ultra-Speed Negative Film By P. H. Arnold	16
The Minnicam-User's Armory of Film Types	
Part II—Special-Purpose Films By William Stull, A.S.C.	19
A New Viewpoint On the Lighting of Agfa Supreme Negative	
. By Arthur Martinelli	25

Timely Topics

MOTION PICTURES ARE YOUR BEST ENTERTAINMENT. . . . To those of us concerned with the making of motion pictures, that phrase ought to be more than just the catchy slogan of a nation-wide campaign to make the public more picture conscious. It should be a yardstick by which every bit of production effort can be measured.

The campaign itself is a great idea. It is being carried through on a great scale by the cleverest minds of the exploitation, distribution and exhibition branches of our industry. But it can backfire disastrously if we of the production division don't back it up by delivering pictures which really **are** the public's best entertainment.

Outstanding pictures can never be turned out to order like so many Ford parts. But if everyone concerned with the making of a picture were to give his work that added touch of personal interest which makes the difference between capable, routine workmanship and whole-hearted enthusiasm, that picture couldn't help being better—stronger—for it.

We've an idea a survey of the industry's all-time hits would show that all of them were made by men and women who threw themselves into their work sincerely convinced they were producing something worthwhile. We're equally sure the industry was built up to its present success largely by people who honestly believed the motion picture offered the public something better in entertainment than it had even known before.

So—why not make the industry's present, greater campaign the occasion for a private campaign of our own? A campaign to restore our own confidence in what we are doing . . . a campaign to side-track our exaggerated, unnecessary intra-industry political squabbles . . . a campaign to squelch the calamity-howlers and sophists within our own ranks. In short, a campaign to rekindle our own faith that MOTION PICTURES ARE THE BEST ENTERTAINMENT.

* * *

Writing in a recent issue of *The American Cinematographer*, President Victor Milner of the A.S.C. gives some characteristically interesting views on one of the most debated technical subjects of today. His comments on the professional use of photoelectric exposure-meters, and the professional's needs in that direction, merit serious consideration by anyone interested in cinematic technology.

With all due respect to those of our friends who do not care to utilize such aids, we're inclined to take sides with Milner. As he points out, the work of the cinematographer is two-sided: it is at once highly artistic and highly technical. To our way of thinking, anything which will relieve him of routine mechanico-technical drudgery is just so much more to the good. His fellow-workers, the recording and laboratory experts, have at their disposal far more

in the way of technical aids than he has, yet they have sacrificed nothing of their individuality. Sound men have innumerable mechanical short-cuts comparable to the cameraman's light meters, yet recording certainly shows no signs of becoming a standardized, purely mechanical craft. The lab-men who process the cinematographer's film have taken advantage of the aids of sensitometry, of scientific control of solutions, and the like, yet the variations between one laboratory and another are as well marked as ever they were in the days of racks and guesswork.

The photographer has even more to gain from the use of modern scientific aids. In just the measure he can free himself from the routine, mechanical aspects of his work, just so fast can he gain added time and energy for the advancement of his artistic work.

We can also second Milner's plea for light-meters designed more truly for professional use under modern conditions. When such modern emulsions as Agfa Supreme are used with lightings that take full advantage of their speed, new and incredibly low exposure levels become normal. Light-measuring devices which were accurate for the lighting conditions familiar with superpan-type films can become misleading used under these new conditions. Inevitably, as cinematographers grow more and more accustomed to the possibilities of this film, the normal in lighting is descending to progressively lower illumination levels. Meters designed to coordinate with this trend would be of the highest value to cinematographers in and out of the studios.

* * *

Reliability of product must be the keynote of any lasting success both in the manufacture and the use of motion picture raw stock. Cinematographers here in America have established amazing standards of photographic reliability in their work. Since this uniformity of personal technique must necessarily depend upon the uniformity of the film products used, it is only logical that our cinematographers insist upon reliability in their raw film.

But this insistence upon reliability can be carried too far. All of the widely used film products of today are reliable. That much can be taken for granted. The really vital question should be whether or not the film is genuinely suited to modern needs.

It seems to us that cinematographers who overlook this fact are doing injury both to themselves and to their employers. When all available film products are of closely similar type and characteristics, it may be well enough for a cinematographer to say, "I use XYZ film; I've used it for years and I know it is reliable." But when film products are available which in addition to equal reliability, offer superior fitness for today's conditions and work, that same attitude ceases to be commendable.

In plain English, a man who takes that ultra-conservative attitude is deliberately closing his eyes to something which may improve his work and give his employer better photography at lower costs. The producer is paying this man not alone for his purely photographic ability, but for having the intelligence

and energy to keep up with all developments in his field. The producer is seldom technically-minded enough to follow or to interpret such technical advances. The cinematographer is, and it is his duty to his employer and to himself to do so freely and with an open mind.

* * *

One of the industry's best-known cinematographers recently told us that the only time he felt he could take things easy on a production was when his studio assigned him to one of the big "A" pictures. When assigned to a "B", he said, he worked twice as hard.

We wonder if some of us haven't gotten a wrong slant on these "B's". Often enough, from a standpoint of production, direction and cinematography they represent creative effort fully as great and frequently far more meritorious than do their more pretentious fellows. Its a fine thing to make a great picture when you have the almost unlimited time, money and facilities granted by the high-budget films. But isn't it more of an achievement to turn out a production acceptable under modern standards (which are high!) when the purse-strings are tight, and time and facilities strictly limited?

It would be a great thing if some of the people who look down on the lowly "B" could study a list of the many low-budget films which have smashed their way into the box-office champion class, to say nothing of the many now forgotten super-specials of the same periods. How many of them, for instance, could name the lavish special that received MGM's chief attention at the same time King Vidor and John Arnold were filming a program picture called "The Big Parade"?

* * *

Among the things we'd like to know is why neither of our industry's two great phototechnical magazines have thought of publishing a discussion of the possibilities offered by the modern miniature camera for all-around studio still work. There's a great deal to be said on both sides of the question, and these magazines offer a logical field for frank debate by genuinely informed authorities.

To us the combination of an efficient 35mm. miniature camera, with modern fast lenses and such high-speed, fine-grained films as Agfa Supreme offers tremendous attraction. Still men have always complained they were seldom given adequate time or cooperation to make their stills as they should be made. Many members of the production staff, on the other hand, complain equally at the amount of time necessary to bring a big 8 x 10 into action. It seems to us the minicam could do a lot toward solving these problems, giving the still man more and better stills, and minimizing the delays which irritate other workers.

Just as an example of what the miniature camera, in capable hands, can do, we might point to Paramount's still department, where a battery of Contaxes

successfully carry a major part of the burden of getting what the publicists call offstage and candid "art". What's more, the minicams permit the making of a greater variety of poses on a given assignment, with the result that more "exclusives" can be reserved for captious editors. We've an idea the minnies would give the bigger boxes a mighty good run for their money if someone would give them a chance on production still work!

* * *

An innovation potentially capable of exerting far-reaching effects on the industry's production methods is described in a recent article by Victor Milner, A.S.C. In his current production was action which would gain dramatic value if it could be laid in some of New York's more noted institutions. Duplicating these locations convincingly in studio-made sets was out of the question. As he puts it, few if any stages would be physically large enough to hold authentic duplicates of the Waldorf's Starlight Roof or Radio City's Rainbow Room. A complete company could not well be sent to New York for these scenes. The Transparency or projected background process offered a chance of success—provided the necessary background scenes could be photographed successfully on the genuine locations.

Milner's description of how the lighting and other problems involved were mastered makes an article interesting to read in its own right. But beyond this interest, the experiment has a more far-reaching significance which deserves the attention of everyone. If the outcome is successful, the industry will have gained a valuable new method of increasing production value without at the same time increasing production costs unreasonably. In addition, with the further advantage of today's exceptionally fast emulsions, we may logically hope to see studio-made scenes using as backgrounds authentic locales which, less than a year ago, could never have been photographed. The production immediately involved may not be counted among the industry's most opulent or dramatically significant productions, but we venture to say it will be watched more closely by the technical community than many a current special.

* * *

We hope every cinematographer can find time to attend the current revivals of famous films of the past. They offer food for a lot of thought. Not long ago, we saw a showing of "The Sheik", one of the more important releases of fifteen or sixteen years ago. Last night we attended the preview of a relatively unimportant "Western" made by the same studio. As an exterior night sequence—photographed on Agfa Infra-Red film—flashed on the screen, we couldn't help contrasting it with the night-scenes of the earlier film, made before this modern aid was available. Fifteen years ago it required a title and a blue-tinted print to tell the audience it was night. Today the photography alone tells the story—convincingly.



CANDLE-LIGHT SERVICE

Photographed by Charles James Fox

Four Useful Optical Formulas

By ROBERT MITCHELL, JR.

TO AN increasing extent during the last several years, the artistic and executive duties of a modern Director of Photography have been such as to leave him less and less time for intimate contact with many of the more basic mechanical phases of cinematography. Under these circumstances it is only to be expected that members of the profession now and again find themselves at a loss to recall the details of some of these rather elementary laws which govern their work.

For this reason the author presumes to re-state in simple form four such principles in the field of photographic optics. Any of them may be applied helpfully to problems which may arise in studio camerawork; even more frequently they may be found useful in the hobbies of miniature camera photography and substandard cinematography with which so many studio cameramen occupy leisure moments.

Apertures and Focal Length

Perhaps the basic formula of practical photographic optics is:

$$f = \frac{F}{D}$$

or that little *f* equals big *F* divided by *D*. It deals with lens-speed, the diameter of the aperture at that speed, and focal length.

In this "*f*" represents the speed of the lens in relation to its focal length, and is of course familiar to all photographers. The focal length itself is represented by "*F*", while "*D*" represents the actual diameter of the aperture at the particular *f*-stop in question.

In other words, **speed value equals the focal length divided by the diameter of the aperture used.**

For any given lens the focal length "*F*" naturally remains constant, while the two other factors are variable. Thus if any two of these factors are known, the formula shows us how to find the third.

Suppose, for instance, we have a lens the speed calibrations of which we doubt, or which are undecipherable. The focal length is known to be 50mm., and the maximum aperture is measured and found to be 1 inch or 25mm. Substituting these known values for the letters which represent them in our formula we find that the speed (*f*) equals 50mm. (*F* or focal length) divided by 25 (*D* or diameter of aperture). The result is naturally 2, so the maximum aperture of the lens is *f*:2.

The same formula will enable us to calibrate the lens, for we know its focal



SUNLIGHT AND STEEL

Photographed by Leon Ruder

length and the f-value of the stop we want. Therefore, supposing we want to determine the diaphragm-scale position of $f:8$ on this same lens, we know that "f" equals 8, and "F" equals 50. Though "D" is unknown, we know that in this case 8 equals 50 divided by "D", so "D" must also equal 50 divided by 8, which is 6.25mm. or .2462 inches. Thus we close our diaphragm down until its aperture is of that diameter—and mark that point as representing $f:8$.

If the focal length of the lens is the unknown factor, and we know the f-value of the aperture and know or can measure its actual diameter, the same formula will give us the focal length. For if "f" equals "F" divided by "D", then "F" must equal "f" times "D".

Suppose we have an $f:2$ lens, the maximum aperture of which measures two inches. Since "F" equals "f" times "D", the focal length of this lens must equal 2×2 , which is 4—and our lens is found to be a four-inch objective.

Supplementary Lenses

Another basic formula, and one which can be even more useful at times,



CALIFORNIA

Photographed by Teijo Kobashi

is the one governing the resultant focal length of simple lenses used in combination. This is expressed:

$$F = \frac{f_1 \times f_2}{f_1 + f_2 - d}$$

Translated from mathematical terms into words, this means that the resultant focal length of a combination of two lenses is equal to the focal length of the first lens multiplied by the focal length of the second lens, which product in turn is divided by the sum of the same two focal lengths minus the distance separating the two lenses. (In this, as in all optical formulas, it is important to remember **not** to mix values given in inches with those expressed in millimeters.)

In this formula "d" is measured as the distance between the nodal points of the two lenses; for ordinary purposes, it is sufficient to consider these nodal points as being located at the center of a lens.

For a simple application of this formula, suppose we have two lenses,

one with a focal length of 5 inches, the other of 4 inches, and mount them with their centers 3 inches apart. Then the resultant focal length will equal 5×4 divided by $(5 + 4) - 3$, or 20 divided by 6, which equals 3.33 inches. Here the resultant focal length is shorter than the focal length of either alone! If we could mount the same two lenses 2 inches apart, we would have 5×4 divided by $(5 + 4) - 2$ which equals 20 divided by 7, or 2.86 inches. Thus the smaller the separation between the two lenses, the shorter will be the resultant focal length.

Similarly when the distance apart equals the focal length of either lens the effect of the **other** lens on the resultant is nullified. For instance if in the example the separation were 4 inches, the resultant would be 5×4 divided by $(5 + 4) - 4$, or 20 divided by 5, bringing us back to 4 inches for the focal length of the combination. If the separation were 5 inches, the resultant would be 5 inches (5×4 divided by $(5 + 4) - 5$).

This formula is the basis for determining the supplementary lenses often fitted to finders, and to the camera-lenses of some types of color-cameras, to give wide-angle effects where lenses of extremely short focal lengths are actually impossible. Suppose, for instance, we have a 2-inch lens, and fit over it a single supplementary lens (like a still camera's "portrait attachment") with a focal length of 200 inches. In this case let's assume, for convenience, that the fitting is so close the separation is negligible. This would make "F", the resultant focal length, equal 2×200 divided by $2 + 200$, or 400 divided by 202. This gives us a resultant focal length of 1.98 inches—a net reduction in effective focal length of 0.02 inches! For really effective results in achieving wide-angle effects, then, the supplementary lens must be of tremendously great focal length.

Hyperfocal Distance

The hyperfocal distance for any lens is that focal setting of the lens at which every object from one-half this distance from the camera to infinity will appear in approximately sharp focus on the film. If the hyperfocal distance is 68 feet, in other words, everything from a point about 34 feet from the camera to infinity will be in reasonably sharp focus **if the lens is focused at the hyperfocal setting** which in this case is 68 feet.

This point is dependent upon three factors: the focal length of the lens, the aperture used (expressed as an f-value) and the circle of confusion.

If lenses could be made perfect, the circle of confusion, theoretically, would be a point, for the term refers to the diameter of the image on the film of any given point in the subject. Unfortunately, not even the finest lenses can bring the images of all wave-lengths or colors of light to a focus so perfectly in the same plane that the image of a point will be a point. Instead, some wave-lengths come to a focus on the desired plane, while others focus in front of it or behind it. The results is that the point is reproduced as a circle, rather than a point. This is called the circle of confusion. In some of the finest lenses it is microscopically small, but still remains mathematically measurable. The manufacturers of the Robot camera, for example, base their sharpness on a circle



OCTOBER

Photographed by Allison A. Perrin

of confusion .001 inch in diameter; in most 35mm. motion picture work, the permissible circle of confusion is assumed to be .002 inch.

The formula for determining the hyperfocal point is:

$$H = \frac{F^2}{f \times C}$$

In other words, the hyperfocal distance equals the focal length of the lens multiplied by itself and divided by the product of multiplying the f-stop by the circle of confusion. It will be observed that two of these factors—focal length

and circle of confusion—remain constant. The other two may vary, and therefore influence each other.

Suppose we have a 2-inch lens used at f:2.3. Assuming the circle of confusion as the usual .002 inch, we have "H" equals 2×2 divided by $2.3 \times .002$. This evolves to 4 divided by .0046, and gives us **896 inches** or approximately **72 feet**. If the lens is focused at 72 feet, everything from a point about 36 feet from the lens on to infinity will be reasonably sharp.

But if we take the same lens and stop it down to f:11, we will have "H" equal to 2×2 divided by $11 \times .002$. This works out to 4 divided by .022 and in turn gives us a hyperfocal distance of **181.8 inches** or about **15 feet**; everything from about $7\frac{1}{2}$ feet to infinity will be reasonably well defined at this setting.

Depth of Field

Depth of field is often confused with depth of focus. The latter actually is the distance which the lens may be moved in or out before a given object in sharp focus goes out of focus. Depth of Field is the distance between the nearest plane in sharp focus and the farthest plane in sharp focus. More simply, it is the distance between the nearest and farthest objects in sharp focus at any given time.

These points are determined by use of the two following formulas:

$$\text{To determine nearest plane:} \quad \text{Near} = \frac{D \times H}{H + D}$$

$$\text{To determine farthest plane:} \quad \text{Far} = \frac{D \times H}{H - D}$$

In this, D represents the distance of the object, and H represents the hyperfocal distance under the conditions of stop, focal length and circle of confusion applying to that particular shot.

For example, suppose we use the two-inch lens previously mentioned, at its maximum aperture of f:2.3. The hyperfocal distance is the same as in the previous example—72 feet. Assume our object is 40 feet from the camera. Then:

$$\text{Near} = \frac{40 \times 72}{40 + 72} = \frac{2880}{112} = 25.9 \text{ feet.}$$

$$\text{Far} = \frac{40 \times 72}{72 - 40} = \frac{2880}{32} = 90 \text{ feet.}$$

But suppose the object distance is 72 feet, which is the same as the hyperfocal distance. In that case we find that:

$$\text{Near} = \frac{72 \times 72}{72 + 72} = \frac{5184}{144} = 36 \text{ feet.}$$

$$\text{Far} = \frac{72 \times 72}{72 - 72} = \frac{5184}{0} = \text{which is mathematically infinity!}$$

On the other hand, when the object distance is greater than the hyperfocal distance, the resulting answer for the far plane becomes a negative or imaginary number, and as such has no practical value.



35MM. ENLARGEMENTS FROM "KING WINTER"

Photographed by Chalmer Sinkey

Infra-Red For Dramatic Effects

By CHARLES FORD,
Producer, Republic Studios.

TESTS—especially tests of new photographic materials or methods—are ordinarily an extremely private matter. They are made solely for showing to company personnel, for guidance in applying the new material or method to actual production.

Shortly before I left my former post as Editor of the Universal Newsreel to accept my present place with Republic Studios, however, I participated in the making of a test which I believe is unique. It was our first test of Agfa Infra-Red negative film. Intended solely as a test, the results proved so unusual that we released the test as a regular issue of Universal's short-subjects series "Going Places"!

Moreover, the film has proved remarkably successful. Titled "King Winter", it was filmed entirely among the snow-clad mountains surrounding Crater Lake in Oregon. Its appeal depends wholly upon the bizarre quality of its photography. Chalmer Sinkey, who photographed it, deserves a world of credit for the unusual way his camera has dramatized the weird beauty of the scenes, and for the technical skill which enabled him to obtain such results with a new and unfamiliar sensitive material. Characteristically, he gives much of the credit to the fact that the Infra-Red film enabled him to achieve dramatic effects impossible with ordinary emulsions.

Dramatic Day Effects

At about this point, I can hear my friends among the studio cinematographers, who for several years have used this film for dramatic night-effects, beginning to wonder audibly why we thought there was anything unusual about getting dramatic effects with Infra-Red film. True enough, there would be nothing

unusual had we confined our test to capturing the daytime night effects for which the film was intended. But practically all of our footage was **not** night effects, but extreme overcorrected **daylight effects!**

In other words, we tried using the Infra-Red film for effects which could ordinarily be considered as being in the province of conventional superpan emulsions!

The results proved that for such highly dramatized pictorial effects, Agfa Infra-Red negative is definitely superior to conventional panchromatic types. Using ordinary types of film we could, with the same heavy filtering, have obtained a similarly heavy overcorrection: but we would not have obtained the dramatic force, the unusual quality we got with Infra-Red.

For one thing, while heavy filtering on ordinary film would have brought the sky down to the desired jet black, making the clouds and snow-clad mountains stand out strikingly, this filtering would have lost us our foreground detail, and would have given us harsh contrasts we did not want.

Foreground Detail

If you will study the accompanying illustrations, you will notice that in spite of the dramatic overcorrection, contrast is not exaggerated. The white expanses of snow are not "washed out": they still retain a natural amount of texture and detail. On the screen, you see snow—not whitewash.

At the other end of the scale, the shadows are equally remarkable. Under ordinary conditions, using conventional films and heavy red filters, an exposure which retained the natural texture of the strongly illuminated snow-banks would lose shadow-detail. In "King Winter" the snow-clad highlights are natural, while at the same time there is ample detail in even the heaviest shadows. Ordinary intermediate shadows are beautifully "open". In fact I am inclined to believe there is more detail in these shadows than would be visible to the average eye on a bright day in such a snowy region.

Normal Face Values

In filming these scenes, Sinkey handled the Infra-Red film much as he would handle any ordinary super-panchromatic type. He used a 29-F filter for most of his scenes, and gave a full, normal exposure. His lightings ranged from the flattest of front-lightings clear around to direct back-lightings. In every case he chose his lighting without particular reference to the special type of film he was using, merely choosing a lighting which would in his opinion be effective for that shot if he had been using ordinary emulsions.

In some of the scenes, people appeared. It is interesting to note that no special make-up was used, yet faces in every instance appeared normal and satisfactory. In some instances, no make-up at all was used, yet the results were satisfying.

The negative was processed in several different laboratories. Part of the footage was developed in two different Hollywood plants. Other scenes were

processed after Sinkey's return from the Coast, by Consolidated's New York laboratory.

In making the rushes and later the release-prints, we learned something very important about the use of Infra-Red film for normal, overcorrected day effects. Using the film for night-effect scenes filmed in daylight, it is possible to intercut the Infra-Red scenes with other shots made on ordinary super-panchromatic films in any way that may be necessary.

Using the same film for this special type of day effects, we discovered that the Infra-Red scenes cannot successfully be intercut with similar scenes attempted on ordinary emulsions. The differences in contrast, exposure, printing value and quality are so great as to be beyond the range of compensation possible to most laboratories. The Infra-Red scenes would show up the ordinary ones most embarrassingly.

Editing Problems

This works no particular hardship on the producer of scenic short-subjects, for as a rule such films maintain one photographic mood from start to finish. The same fact need occasion no trouble to the feature producer who has a sequence calling for this type of dramatic camerawork, either. Since our experiments proved that people photograph satisfactorily under the conditions stated, no trouble need be expected from that phase of the problem. For the rest, it is easy enough to photograph an entire sequence requiring dramatic Infra-Red day effects with this one type of film. Since the dramatic effect in itself makes a notable difference in quality between such a sequence and ordinary interior or exterior scenes, the dramatized sequence, as long as it is made entirely on the one type of film, can be cut into conventional sequences with no difficulty whatever.

Summed up, Sinkey's experience shows that Infra-Red film can be used to open up a whole new range of dramatic camera effects in addition to the familiar night-effect scenes. For dramatically over-corrected day exteriors, with or without people, it permits effects never before possible.

35MM. ENLARGEMENTS FROM "KING WINTER"

Photographed by Chalmer Sinkey



Problems In The Use Of Ultra-Speed Negative Film

By P. H. ARNOLD

Agfa-Ansco Corporation, Binghamton, N. Y.

NEW photographic problems have arisen from the introduction of motion picture negative films having a greater increase of speed over the prevailing types than the supersensitive panchromatic films had at the time of their introduction. Some of the problems confronting motion picture cameramen and laboratory technicians can be considered in the light of solutions that have been evolved by theory and practice.

In general, Ultra-Speed panchromatic film, compared to Superpan negative film, is much faster; slightly flatter in gradation; similar in color-sensitivity, with slightly greater response to red light; and possessed of a somewhat coarser grain. Of these characteristic differences, the speed relationship has the greatest magnitude.

The Problem of Correct Exposure

A wide variety of tests made under a number of conditions of practical photography have shown that Ultra-Speed panchromatic film is correctly exposed when given two lens stops less exposure than Superpan negative film. Since the principal application of the film tends toward those conditions of photography or to cinematographic subjects that have been considered difficult to photograph or impossible to record because of insufficient illumination the problem of correct exposure can not always be solved by reference to correct exposure technic for supersensitive panchromatic negative films.

Actinometers, or exposure meters, are of little assistance under these dim light conditions since the camera position is usually remote from the subject, which, in turn, is often inaccessible for average brightness measurements. Moreover, the photographic subjects made practicable by the Ultra-Speed panchromatic film usually have too low a brightness level to activate photoelectric exposure meters in common use. Fortunately the sensitivity characteristics of the new film are sufficient to produce successful pictures under typical indoor illumination, with normal shutter angles and at camera speeds of 24 frames a second, using lenses having relative apertures of $f/2.3$ and, in some cases, $f/3.5$.

The speed of the film is not appreciably affected by age. No allowances need be made in exposing old film since the Ultra-Speed film has proved to

*Abridged from The Journal of the Society of Motion Picture Engineers, September, 1938, Vol. XXXI, No. 3.



MOUNTAIN LAKE

Photographed by Dr. Herbert Meyer, A.S.C.

have exceptional stability with respect to speed and gradation, as well as resistance to fog and deterioration during a period of eleven months.

Single-System Sound

In newsreel cameras that record sound on the same film with the picture image, a reduction of lamp current of approximately 15 per cent has been found adequate to compensate for the speed difference between Ultra-Speed panchromatic film and supersensitive panchromatic negative films. The introduction of a Wratten No. 47 (C-5 tricolor blue) filter into the optical system

of the recorder accomplishes the same purpose without requiring alteration of the lamp current.

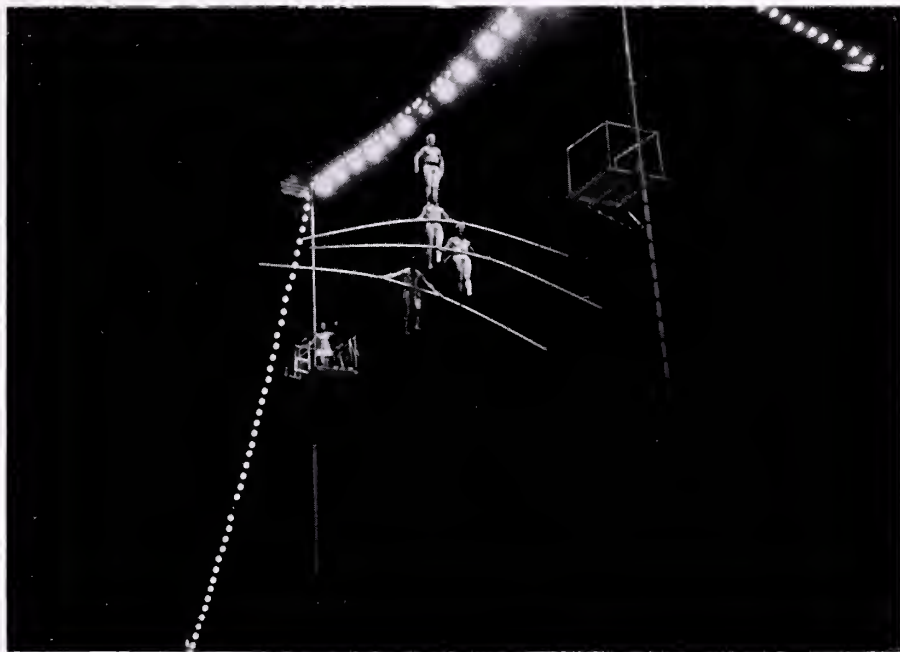
When exposed on typical sensitometers available in commercial motion picture laboratories, Ultra-Speed panchromatic film records density on all the steps because, when these instruments were designed, films having the sensitivity of Ultra-Speed panchromatic film possibly were not contemplated; whence the sensitometers have been calibrated to suit the speed characteristics of the supersensitive panchromatic emulsions. In order to study the threshold or shadow density characteristics of the Ultra-Speed film, the addition of a 25 per cent neutral density filter has been found advisable, since it produces sensitometric strips having the required range of density without altering the characteristics of the lamp or disturbing the calibration of the sensitometer.

The speed advantage of two diaphragm stops, of Ultra-Speed panchromatic over Superpan negative film, is fairly constant under various daylight and artificial lighting conditions, indicating close similarity in the color-sensitivity characteristics of the two films. Wedge spectrograms, however, show that the Ultra-Speed film has a slightly greater range of sensitivity to red light than the previous film and photographs of the color chart show that Ultra-Speed panchromatic film has about 20 per cent greater response to red-colored objects than the old Superpan negative film. The photographic problem introduced by these color-sensitivity dissimilarities is not great and in most cases can be neglected with confidence. No special character make-up has been found necessary with the Ultra-Speed film even under 100 per cent tungsten illumination.

Problems of Printing and Development

In timing negatives made on Ultra-Speed and Superpan negative film, no allowances need be made for differences in the gray-base color, since they both have the same type of neutral gray antihalation layer on the base underneath the emulsion. When combined for printing with other negatives having lavender, pink, or orange-tinted gray bases of similar optical density, the Ultra-Speed panchromatic film may appear to be only three times instead of four times as fast, due to selective absorption of the printing light by the tinted gray bases. From three to five printer points may be required to compensate for the filter effect of tinted gray bases that depart markedly from a neutral gray.

When developed for a gamma 0.65 or lower, Ultra-Speed panchromatic film has a flatter gradation than Superpan negative film given the same treatment. When developed for a gamma of 0.7 or higher, the Ultra-Speed film becomes progressively steeper in gradation than Superpan negative film given the same treatment. Considering the contrast relationship of the two films in the range of negative gamma normally employed in professional motion picture work, together with the photographic characteristics of the subjects that usually will be photographed on Ultra-Speed panchromatic film, best screen results appear to follow the practice of developing Ultra-Speed panchromatic film about 20 per cent longer than Superpan negative film.



AGFA ULTRA SPEED PAN

Photographed by Dr. Ernst Schwarz

The Minnicam-User's Armory of Film Types

By WILLIAM STULL, A. S. C.

PART II

SPECIAL-PURPOSE FILMS

AMONG what may be called Agfa's special-purpose films, the new Ultra Speed Pan has aroused the greatest interest. The variables of negative development, etc., previously mentioned, naturally alter individual opinions as to its speed. My own experience indicates that in daylight its speed should be placed at Weston 128—that is, two notches beyond the right-hand limits of the speed scale on all except the newest Weston meters. Under artificial light, I have had excellent results using a value of Weston 80.

In achieving this phenomenal speed, the Agfa engineers made some sacrifice in grain quality, and since the film was originally intended primarily for newsreel work, gave it a somewhat soft contrast. But in instances where speed is vital, neither of these are serious disadvantages.

The way this added speed increases the scope of "candid" photography will be obvious. With modern fast lenses, operating at speeds ranging from $f:2$ to $f:1.5$, virtually anything that can be seen can also be photographed.

Modern Fine-grain films are capable of tremendous enlargement. Compare size of contact print in man's hand with enlargement (from the same Agfa Finopan negative) on wall.



Similarly, many pictures which under previous conditions would have demanded a synchronized flash, even with fast lenses, are now possible without such disturbing aids. In the same way, as many minnicam-users are realizing, Ultra Speed Pan is opening to those limited to the less expensive f:3.5 and slower objectives, fields formerly the exclusive property of the owners of fast lenses.

There is another aspect to the use of this film which has as yet received little comment. This is its use under circumstances which ordinarily would permit the adequate use of slower films. Some of these should be obvious at once, for any photographer, granted his choice between making a picture with an emulsion which forces him to use his lens at maximum aperture, and one which permits him to use a reduced stop, will choose the latter. This is perhaps most easily evident in the case of speed photography where extremely high shutter-speeds—from 1/500 to 1/1000 second must be used. With ordinary superpan-type film under conditions where a full exposure with 1/1000 second would call for an aperture of f:3.5, Supreme would permit stopping down to f:5.6, and Ultra Speed Pan to f:7.

The same advantage can be found in the case of many other types of picture which do not require such extremely fast exposures. In many cases one is faced with the choice of either stopping down for detail and depth, using in consequence a relatively slow exposure, or of sacrificing definition for the shorter exposures permitted by larger apertures. In this case, the faster film permits one to have his cake and eat it too, by using both small apertures and quick exposures. This should be especially valuable to the numerous mini-

camerists who have a tendency to jab the shutter release, and thereby blur exposures made at 1/25 second or slower.

This is also advantageous in using filters. Often the use of filters under poor light conditions, or under normal conditions when the heavier filters are used necessitates exposure increases which again bring this choice between depth and definition or overly long exposures. The use of a faster film like Supreme or Ultra Speed Pan often solves this.

It naturally follows that Ultra Speed Pan can be used outdoors with filters like any other panchromatic film. Due to the somewhat flatter gradation of this emulsion, it is advantageous to avoid featureless flat lightings, and at times to utilize such filters as the G and the various red filters—the A and F series—which increase contrast. The filter factors for this film are:

Aero 1	1.5
Aero 2	2.0
K-1	1.8
K-2	2.0
G	2.5
23-A	3.5
25-A	5.0
F	7.0

Infra-Red

Another film which has created a great deal of comment is Agfa Infra Red. While this film has become universally used for exterior night-effects by professional cinematographers, many miniature-camera users have seemed at a loss as to how it should be used and exposed.

One of the applications to which Agfa Infra-Red film is perhaps most admirably suited, is its use for pictorial photographs in which a dramatic sort of beauty is desired. The deep, heavy shadows, the dark skies, and glistening highlights that are obtained in outdoor pictures made on this film, are remarkably helpful in creating the dramatic mood required for some subjects. In the same fashion, a fantastic sort of beauty results from the sunny, almost snow-like appearance of grass, shrubs, and trees, for the chlorophyll contained in most foliage reflects a large proportion of infra-red radiation to which the film is sensitive. But often more intriguing and beautiful than even these effects, is the striking way in which creamy-white cloud formations are captured by Infra-red film and emphasized in dramatic relief against a cold blue sky that in the finished print is rendered in rich, deep tones. The combination and development of these effects with Infra-red film presents almost limitless possibilities to the pictorialist who is interested in interpreting the beauty of outdoor subjects.*

The matter of exposure is a difficult one to generalize upon. It is almost impossible to give an arbitrary Weston speed for this film because not only

*See also "Infra-Red for Dramatic Effects", P. 13.

does the infra red radiation vary as much as does the radiation of visible light, but the meter's cell, like the eye, is relatively insensitive to this invisible light. Furthermore, this film may be used for several different purposes, each of which requires individual exposure technique. In the studios, for instance, Agfa Infra-red film is used for making night-effect scenes by daylight. It may be so used by individual miniature-camera users, as well. It may also be used for normal, overcorrected filter effects, or for cutting through extreme haze in landscapes.

In any event, Agfa Infra Red, unlike all previous infra-red-sensitive films, does not require visually opaque filters. All that is necessary is to eliminate



A DRAMATIC FILTER-
SHOT ON AGFA
INFRA-RED

Photographed by
Dr. Ernst Schwarz

the blue, violet and ultra-violet to which this film, like any light-sensitive silver compound, is sensitive. Virtually all of its remaining sensitivity is in the red and infra-red, so it is superfluous to filter out the other visible rays. In an emergency almost any deep yellow filter which cuts out all blue and ultra-violet will do, but the best filter to use with Agfa Infra Red Film is a medium-red filter, like the Wratten 23-A. In that case, for night effects, I have found exposures should range between $f:4.5$ and $f:3.5$ at $1/25$ second under bright sunlight in a Southern California summer. In some instances, still less exposure should be given, depending, of course, upon the subject. Where normal day effects, or extreme haze-cutting are desired rather than night-effects, the exposure should be on the full side.

In making night-effects with this film, professional cinematographers have learned several things. For one, the most convincing effects are secured by composing the picture so that a rather heavy shadow cuts across the foreground. For another, while clouds ordinarily add to the pictorial value of a scene, they do not add to the convincingness of a filtered night-effect. Such scenes depend greatly upon a jet-black sky, which suggests night. Thus the best night-effects are those which include a cloudless sky. Similarly, if film and filter are to darken the sky, the camera should not be pointed closer to the sun than a 90 degree angle; the best results come shooting directly away from that part of the sky in which the sun is. Lighter filters and fuller exposures, incidentally, give a lighter sky, which suggests the luminous quality of a twilight sky.



In Emergencies Infra-Red Can Be Used Without A Filter, As This Picture By Dr. Ernst Schwarz Shows

It is peculiarly interesting that Agfa Infra-red film need not be restricted in use to the special types of work described above. Many photographers have found that when occasion demands, the film can be used satisfactorily without filters, to obtain a picture similar in general appearance to that produced when a regular panchromatic film is used without filter. This procedure affords an obvious advantage when there is no opportunity or time to reload the camera with a regular panchromatic film for a few "straight" photographs. Naturally the interpretation of color values in the photograph is not then strictly accurate, because Agfa Infra-red film is relatively insensitive to green and yellow light; but for many subjects this is a minor consideration. When used without filter in this way, the film can be given about twice the exposure which would be used for Superpan Supreme.

Reversible Superpan

Agfa Reversible Superpan is another special-purpose film. Its basic char-

acteristics are the same as those of the familiar Superpan, though its speed is slightly less—Weston 24 to daylight, 16 to Mazda.

This film can be valuable in several ways. Since it gives a positive transparency rather than a negative, it can be a means of simplifying things for those who, for business or pleasure, make use of projected film-slides or transparencies. With this film, such slides can be made directly, rather than going to the intervening trouble and expense of making a negative and then having transparencies printed therefrom.

But this film has also a further application. Like mose reversal emulsions, Agfa Reversible Superpan has unusual fine-grain characteristics. It is therefore an excellent material for making pictures from which extremely large prints are to be demanded. This film cannot, of course, be developed as a negative, but it can be reversed in the usual way, and then used for the making of an enlarged negative of any size, from which either contact prints or further enlargements can be made.

This, incidentally, offers great possibilities to those who use the advantages of the miniature-camera for portrait or commercial photography. Such work often requires retouching or other alteration of the negative, which is difficult, if not impossible with ordinary minnicam negatives. Using Agfa Reversible Superpan for the original picture and making an enlarged negative, such retouching becomes wholly practical.

Thus it will be seen that each of Agfa's six miniature-camera films fits neatly into some definite purpose of the minnicamerist's work. To sum things up briefly, it will be seen that there are three general-purpose films, and three special-purpose films, each of which has its special utility.

Agfa Supreme is the unexcelled all-around film for snapshotting landscapes, speed pictures, portraits, candid camerawork, and nearly every phase of amateur and professional minnicam work.

Agfa Finopan is a fine all-around film especially suited to pictures and individuals where extreme fine-grain quality is paramount.

Agfa Plenachrome is an economical outdoor film, especially useful where it is desired to differentiate strongly between oranges and red.

Agfa Ultra Speed Pan is the unique film for any purpose which calls for unsurpassed speed—for working under unfavorable illumination, for speed work, and the like.

Agfa Infra Red was specifically created for making night-effects by daylight, for intentionally overcorrected filter shots to obtain dramatic effects, and for penetrating haze in distant landscapes.

Agfa Reversible Superpan is specially suited to making direct transparencies, and to making pictures for extreme enlargement by means of enlarged negatives, or where minnicam pictures must be retouched or modified.

It is hoped that this discussion of Agfa's six miniature-camera films will help those who use them to answer the often perplexing question of which film to choose for a given picture.

A New Viewpoint on Lighting Agfa Supreme Negative

By ARTHUR MARTINELLI

AS LONG as there are cinematographers there will be different ideas as to how photographic problems should be solved. I have enjoyed reading in previous issues of AGFA MOTION PICTURE TOPICS the views expressed by several representative members of the profession about the best ways of using Agfa Supreme negative and its additional speed. Some, I recall, favor keeping lens apertures normal, and reducing the amount of light used. Others keep the lighting normal, and stop down the lens.

My own method is different from either. I won't say it is the best, but it has the advantage of giving me the type of photography I want. To me, this is an important thought in approaching any problem: for while each of us is striving for better photography, each has a slightly different idea of what he wants in order to bring it about. Some of my friends, for instance, favor extreme low-key lightings. Others favor increased depth of focus.

For my part, I favor softness. Our modern lenses, intelligently used, will give us adequate definition. But extreme visual contrast is and always has been a photographic bugaboo.

Soft Lightings

For this reason, regardless of what type of film I may be using, I plan my camerawork and lightings, indoors and out, to give me softer, more natural effects.

I have found the added speed of Agfa Supreme negative a definite advantage in gaining this end. It gives increased opportunities to soften my lightings, and to gain more pleasing effects.

With a faster film, it is of course possible to reduce the size and power of the lamps used. But this in most cases, if not perhaps in all, might mean an increased use of bare, undiffused lamps. To me, the quality of light emitted by an undiffused lamp is distasteful—unnatural. I infinitely prefer a diffused beam.

Therefore in my use of Supreme negative I keep the lens at its normal, maximum aperture, and I balance the speed of my emulsion by taking advantage of a very welcome opportunity to use additional diffusion on my lamps.

The effect of this style of lighting is much more pleasing to me. I get a soft naturalness that does a great deal to rob the picture of the dangerous effect of being obviously the product of a studio sound stage. There is a further advantage in that the additional diffusion so spreads the light that I

need give less thought to placing a specific "filler" light to illuminate each shadow.

Exterior Softness

The same principle is of equal value in exteriors. If anything, it is more valuable. Any modern film is really too fast to permit us to use full lens and shutter apertures outdoors. The answer, far too frequently, is sought simply in closing down the diaphragm. This effectively cuts the exposure, but at the same time it also increases contrast.

On exteriors I use my lens at the largest aperture possible, and "stop down" my shutter to equalize the exposure.. In addition I generally apply a Wratten 21 filter. I have found this a most excellent filter for all-around exterior photography. It gives a pleasingly normal correction.

In this connection I might point out something which, while an old story to the older members of the profession, may not be so familiar to some of the younger men. This is the fact that when working under unusually brilliant exterior lighting conditions, as in snow scenes, at the beach or in the desert, the natural tendency is to stop down to offset the additional brilliance of the light. This, however, also adds further contrast to the contrast inevitably produced by the brilliant natural light. It is much better to control exposure with reduced shutter apertures, and if necessary with filters as well, and to keep the lens as wide open as possible—even overexposing a trifle at times. This minimizes optical contrast, and aids in maintaining well-matched photographic quality between interiors and exteriors.

Photographic Quality

In general, I have found Agfa Supreme a thoroughly satisfactory film. The increased speed, of course, is an advantage in lighting. The fineness of grain has been most satisfactory, as have the color-balance and gradation. The stability of the film has been very pleasing. I have used the film on a good number of pictures for several different producers. Those of us who have been in the business for many years naturally grew up in the tradition that added speed must be purchased by sacrifices in stability and uniformity. But although I have used Supreme on several locations which would be a good test of any film's keeping quality, and have employed footage from many different emulsions, the consistent performance of the film has been equal to that of any I have ever used.

It is only natural that, since a cinematographer's living depends upon what he can put on the negative, he should approach any great change in film characteristics with caution. But in many ways I think we overdo this caution—as witness the way some clung to the old ortho emulsions long after panchromatic was introduced. After all, film is film, and a cinematographer worthy of the name should be master of it. Certainly there should be no doubts about testing and adopting an improved type which helps us on toward our goal.

IN THIS ISSUE

Charles Ford, author of the article on "Infra-Red For Dramatic Effects" (Page 13) is a studio executive with an unusual background. Before coming to his present post as one of Republic Studio's production executives, he was for many years Editor-In-Chief of the Universal Newsreel, and producer of several series of short-subjects as well. **Robert Mitchell, Jr.**, whose article "Four Useful Optical Formulas" on Page 7 is eminently worth reading, is a Chemical Engineer, lately associated with one of America's major tire firms. An enthusiastic photographer, he finds relaxation in digging out apparently complicated facts and putting them to work. **Arthur Martinelli**, whose comments on the use of Supreme Negative appear on Page 25 is one of the industry's pioneer cinematographers.

The pictorial illustrations in this issue are again chosen from among the more notable prints of the Third Annual Rolleiflex Salon. All of them are examples of the use of Agfa films by the nation's leading pictorialists. A most unusual example of the possibilities of modern photography is Charles James Fox' picture of the candle-light service at St. Thomas Church, New York. The exposure was made by pure candlelight, with no flash or other light to assist. The exposure was on Superpan film, 45 seconds at f:3.5.

* * *

MOHR NEW HEAD OF PHOTOGRAPHERS

Agfa Motion Picture Topics takes pleasure in extending to Hal Mohr, the newly-elected President of International Photographers Local 659 of the International Alliance of Theatrical Stage Employees its congratulations and best wishes. The popularity and ability of Mohr are attested by the fact that this is the second time he has been elected to the chief office of Local 659, and that he also is Past President of the A.S.C.

Our congratulations are extended equally to the other newly elected officials of Local 659. These include Herbert Aller, re-elected to the post of Business Representative, Leon Shamroy, Lucien Ballard, and William Skall as Vice Presidents, James King as Recording Secretary, and Len Powers as Sergeant-at-Arms. Edward Pyle, Ernest Depew and Fleet Southcott are the newly elected Trustees.

The new Executive Board of Local 659 includes Charles Bohny, James J. Brooks, William Clothier, Robert Coburn, Eddie Fitzgerald, Russell Harlan, Sanford Greenwald, Clifton Maupin and Lathrop Worth.

NEW WESTON FILM-SPEED CHART

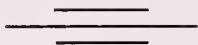
For use with the well known Weston photoelectric exposure meters, the Weston Instrument Corporation has issued a new table of Weston film-speed ratings. In addition to giving up-to-date listings of all of the best known film and plate products, the new chart is noteworthy because for the first time it

specifies the developing conditions, negative gamma, and other vital factors upon which the ratings are based.

Listings are grouped under eleven headings, corresponding to specific uses of the films, each generally employing different processing standards. Many products therefore get multiple listings, and in some cases, show markedly different speeds according to the use and developing methods involved. For ordinary rollfilm service, for example, Agfa Superpan Press is given a daylight speed rating of 100, while under the "Press" grouping, the same emulsion is listed at a speed of 125.

The groupings and their development standards include: Rolls and Packs, based on commercial photo-finishing methods, 5 minute development in DK 50; Miniature Camera Films, based on development to a gamma of .8 in the fine-grain developer recommended by the manufacturer; Press, based on development to a gamma of 1.2; Portrait, based on a gamma of .9; Commercial, based on a gamma of 1.0; Process, based on a gamma of 3.0; Graphic, based on a gamma of 7.0 with the meter reading taken from a white card and using the "O" position on the calculator; Aero film, using a gamma of 1.2; 35mm. Motion Picture Film, based on a gamma of .8 in a borax developer; 8mm. and 16mm. film ratings are based on the manufacturer's own processing. A number of the ratings are qualified as subject to further test, and will possibly be revised in the near future.

The chart is obtainable free from the Weston Company, or from photographic dealers.



The contract of C. King Charney with C. King Charney, Incorporated, distributors of Agfa Motion Picture Films, the expiration date of which was October 15, 1938, has been amicably terminated.

The name of C. King Charney, Incorporated will be changed to Agfa Raw Film Corporation, and the company will continue its business at its present quarters in Hollywood at 6424 Santa Monica Boulevard.



A Hit in Any League



SUPREME



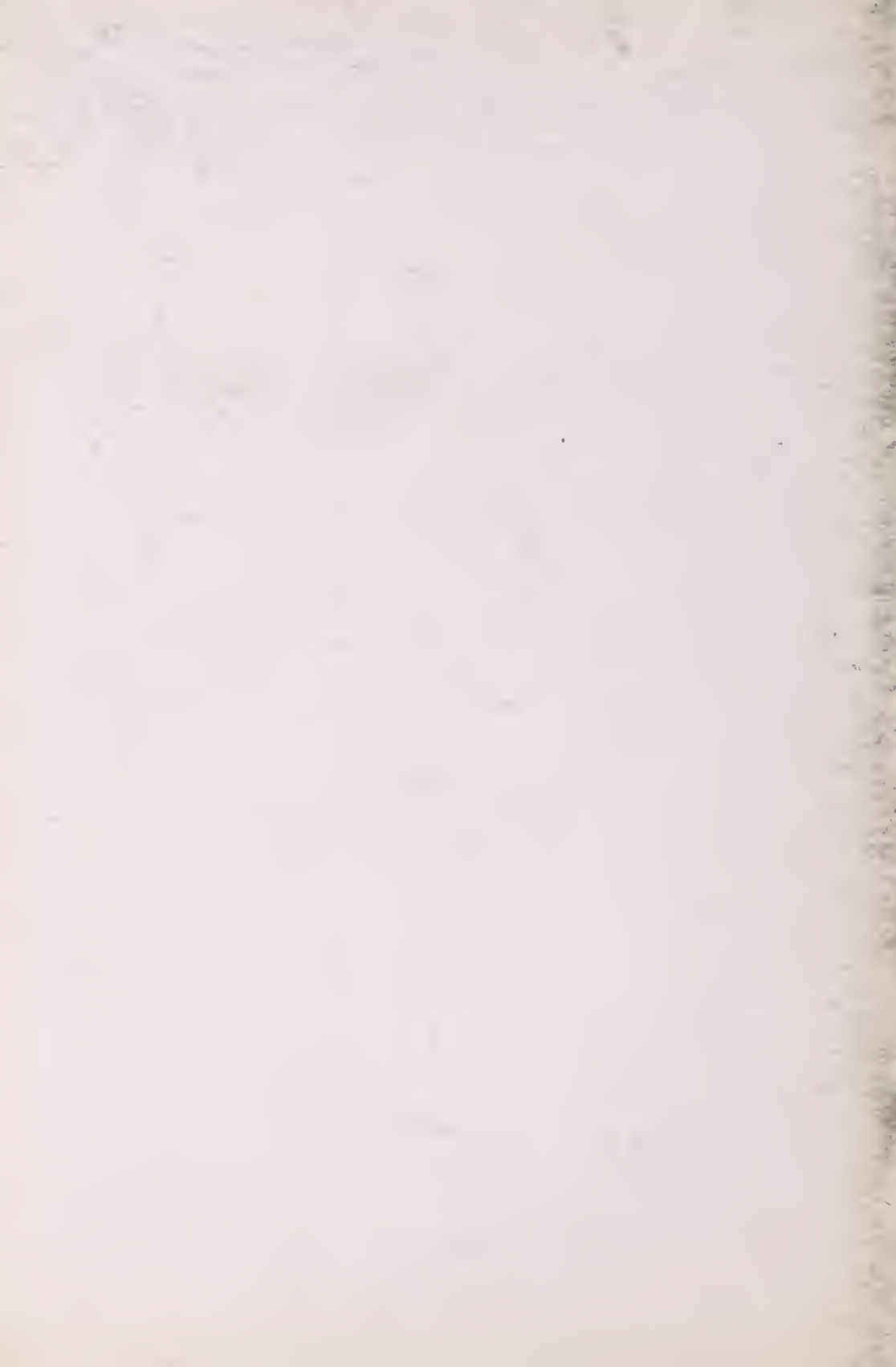
Made by AGFA ANSCO CORP., in Binghamton, N. Y.

Distributed by

AGFA RAW FILM CORPORATION

HOLLYWOOD

NEW YORK



Agfa

Motion Picture
TOPICS

MARCH-APRIL · 1939



MOTION PICTURE TOPICS

WILLIAM STULL - A. S. C. EDITOR

Contents

TIMELY TOPICS 2

AGFA-ANSO'S CENTURY OF PROGRESS 6

THE GRAININESS OF PHOTOGRAPHIC EMULSIONS—PART IV
By DR. A. GOETZ AND W. O. GOULD 17

THE PRACTICAL RELATIONSHIP BETWEEN GAMMA AND VISUAL CONTRAST
By S. D. LUND 23

S. M. P. E. CONVENTION IN HOLLYWOOD 29

OUR ILLUSTRATIONS 31

YOU MIGHT LIKE TO KNOW 32

TOWER OF THE SUN Photographed by Mike Roberts Frontispiece



JEWELS OF THE NIGHT Photographed by Franklin S. Allen

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Timely Topics

ON another page of this issue of AGFA MOTION PICTURE TOPICS will be found an article tracing the history and progress of the present Agfa-Ansco Corporation and its corporate progenitors from the formation of the original Anthony company in 1842 to the present. It is an article frequently requested by those of our readers who are familiar with the romantic history and fine traditions of the firm behind Agfa-Ansco film. It is an interesting and constructive story, yet it is one we've been a bit reluctant to print.

Why? Because in common with many another magazine, we regularly find ourselves restricted by the limitations of type and pages. There is so much of a technical nature that can be said about the Agfa films and their use, and so many friends who are eager to help us say it, that it seemed unnecessarily vain to utilize useful space in telling what is, after all, the typical success story of a typical, pioneer American business enterprise.

But since our friends have had their way, we hope that the readers of this journal will find this necessarily brief introduction to the factory behind Agfa-Ansco film, and to its traditions and methods, illuminating and, to some extent, at least, inspiring. As one who read the article before its publication commented, in these hurried days of "anything for quick profits," it is a refreshing thing to encounter an organization true to the

American business spirit of a great era, when loyal adherence to quality formed the keystone to success.

* * *

THE monthly meetings of the American Society of Cinematographers are, we are glad to see, gaining steadily in interest and importance. Begun shortly after the opening of the A. S. C. clubhouse, primarily as social affairs, these gatherings have inevitably developed into worthwhile forums on current technical problems.

The February meeting, devoted to discussion of photoelectric exposure-meters and presided over by Past President Dan Clark, attracted the largest and most enthusiastic attendance yet recorded. The industry has reason to congratulate itself upon having an institution of this nature where, as we observed at that meeting, cameramen and laboratory experts, film specialists and meter manufacturers could sit down together and discuss their problems with complete frankness which pulls no punches, yet in a spirit of complete good fellowship.

For yet another reason this meeting was of particular significance. This is the surprisingly unanimous acceptance of meters as helpful adjuncts to modern cinematography. Opinions differed as to the most suitable types of meters, and the best methods of using them; but not a voice was raised to question the value of the device. This approval is a

very recent development; even six months or a year ago the argument would have been hottest over the question of whether or not meters themselves were professionally worthwhile. It can hardly be a coincidence that this change has appeared during the same period the new "fast films," such as Agfa Supreme, were being introduced. All of us who make or sell film should feel gratified that our products should have a part, however incidental, in furthering so important an advancement in the industry.

* * *

THE financial columns of our newspapers have frequently chronicled instances in which nationally important corporations have, even during these years of depression and recession, paid dividends to their stockholders. But they seldom record instances in which corporations pay dividends to those who use their products.

Yet that is precisely what the Agfa-Ansco corporation has been doing to an increasing extent over the period of the last four years!

How, you ask?

What else can you call it when a firm offers products which in addition to giving improved basic quality, also permit those who use it to effect notable economies? To save money that they would otherwise be forced to spend?

Let's look at the record. Four years ago was introduced the first Agfa Infra-Red negative film. This enabled the producers and cinematographers who used it to obtain better, more convincing exterior night-effect scenes, at the same time saving the costs in equipment, current, labor and wasted

effort otherwise incurred in making such scenes actually by night.

Two years ago this successful product was supplanted by an improved version, the present Agfa Infra-Red negative, Type B, which greatly extended the field of potential economies from atmospheric long-shots and background plates to include virtually every kind of actual production night-effect scenes. In a word, more money which would otherwise have to be spent remained in the consumer's bank.

Slightly over a year ago, Agfa Supreme negative was introduced. In addition to giving better overall photographic quality, this film, by reason of its greatly increased speed, made possible a tremendous saving in electrical costs. According to one reliable and expert estimate, the saving on an "A" production equalled the average cost of raw negative film for that production. In other words, the use of this film virtually made the producer a present of the raw-stock used in photographing the production.

At the same time, Agfa Ultra Speed Pan made its bow. Disregarding the advantages it offers the newsreel and commercial producer, it has given the studio a means of making background, atmospheric and special shots under conditions hitherto considered photographically impossible. Actual locations—famous rooms and buildings—which otherwise would have to be constructed in the studio, either full size or in miniature—can now be photographed as they are. Actual night street exteriors can be filmed without lights. Again, money that would under conventional conditions be spent, now need not be spent.

Those savings are pretty good cash dividends to the consumer, aren't they?

* * *

WITH this issue, AGFA MOTION PICTURE TOPICS enters its third year of publication. The first issue appeared in February 1937. This is the sixteenth issue published since then. That first issue contained but half as many pages as this, reproduced but a small fraction as many photographs, had fewer and shorter articles, and went to about half as many readers as does this. In view of such evidence, we feel we can believe the many friends who have repeatedly told us that the magazine was steadily changing for the better with each issue.

But in one thing it has not changed. That first issue carried an Editorial setting forth the magazine's policy. That was—and is—to "continually strive to be individual, and not just another publication competing with the many other excellent trade and technical journals already appearing," and instead to "constructively discuss . . . all matters pertaining to the use of Agfa motion picture film . . . and to provide a forum for threshing out new problems constantly arising from the ever-changing conditions in the varied processes of film production."

We hope we have succeeded in this. Our extremely cordial relations with existing trade and technical papers proves our original contention that such a paper as this need not con-

flict with the industry's established journals. The many compliments received, and the widespread interest shown in our journal indicates that we are, in publishing this magazine, serving the industry and its technical people in a constructive way.

So we begin our third year of publication with a repetition of this original pledge, and repeat as well the request made in that first issue—that our readers give us their sincere opinions of what we are doing—critical as well as favorable—and any suggestions which they may feel will help to make AGFA MOTION PICTURE TOPICS more useful and interesting.

* * *

AGFA MOTION PICTURE TOPICS takes pleasure in extending to John Arnold, the newly-elected President of the American Society of Cinematographers, its warmest congratulations. Leader of the organization from 1931 to 1937, Arnold returns to the Presidency backed by universal confidence inspired by his proven leadership.

To Ray June, the Society's new First Vice-President, Teddy Tetzlaff, Second Vice-President, Joseph Valentine, Third Vice-President, and Frank B. Good, Secretary-Treasurer, we also offer our congratulations. Under their guidance and that of the Society's Board of Governors, which counts as new members Charles G. Clarke and Robert DeGrasse, the A.S.C. seems assured of continued growth in stature and in service to the camera profession.





JAHORE TEMPLE, TREASURE ISLAND

Photographed by Mike Roberts



Agfa - Ansco's

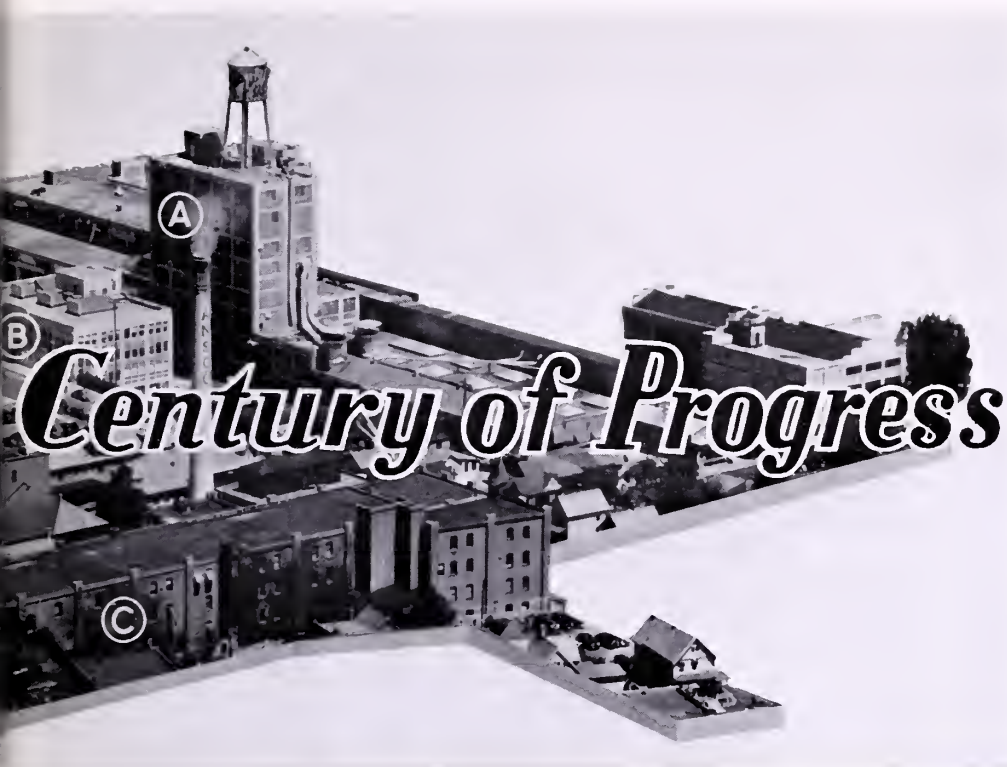
A—Film Plant B—Research and Administration

THIS year American photography celebrates its one hundredth birthday. In but three years more the Agfa Ansco Corporation, too, will celebrate its centennial—the oldest American manufacturer of a complete line of photographic equipment.

The intervening century is a romantic saga of photographic pioneering, liberally studded with “firsts”—pioneer achievements which have become milestones in the history of photography. The story properly opens even before that momentous sixth of February, 1839, when Louis Jacques Mandé Daguerre made the first public announcement of his Daguerreotype process. Some time before this announcement, an American artist resident in Paris visited the French

inventor and became an enthusiastic Daguerrean photographer. This artist was himself something of an inventor—his visit to Paris was for the purpose of patenting his own invention, an electric telegraph—but photographers in general and Hollywood in particular should honor Samuel F. B. Morse as the man who first brought photography to America.

One of the first Americans to learn the Daguerrean art from Morse was a young Columbia University graduate, Edward A. Anthony, who became one of the first amateur photographers in America. In college he had specialized in mathematics and engineering, and he quickly became an expert photographer. With proficiency came the typical Yankee urge to turn his



Building C—Paper Plant D—Warehouse

skill to practical account, and young Anthony became perhaps the first amateur to turn photographically professional.

Settling a Boundary Dispute

During these early years, Anthony put the new process to a dramatic use. Photographing some of the highlands along the Canadian border, his pictures enabled the American Government to settle a boundary dispute, and were the first photographs ever made or used by any government for any purpose.

With this auspicious start, the young man set up a portrait studio in Washington, where he was held in such esteem that the Committee on Military

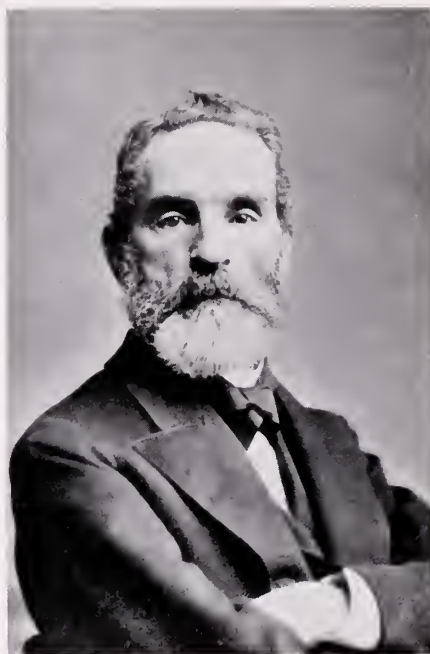
Affairs gave him the use of its committee rooms for his sittings.

Success in this venture (and it can hardly be doubted, the scarcity of dependable photographic materials!) impelled him to go into business as a dealer and manufacturer of photographic materials. The photographic supply house which he established in 1842, at 308 Broadway, New York City, bore the name E. Anthony, and was the forerunner of today's Agfa Ansco Corporation.

Young Anthony built his business rapidly, and with it he built a reputation for integrity and superior merchandise which his successors have continued to this day. Reading some of Anthony's almost century-old advertisements, one is impressed with

the thought that in some things a hundred years need bring little change. for Anthony stressed, even as do his modern successors today, the importance of quality and dependability in photographic materials. In one of his early advertisements Anthony wrote. "My prices . . . will be found to be very low, but I look for a reputation more from their quality than from their low price, being convinced, from former experience as a practical operator, that noting in the daguerrean business is truly cheap but what is good." The phrasing and the products may change, but the underlying viewpoint might well come from any of his firm's current bulletins!

As the business grew, Anthony was joined by his elder brother, Henry T. Anthony. In that year—1852—the Anthonys scored another notable photographic "first" when they held



Edward Anthony

the first photographic prize contest in the world. Yet another pioneering achievement was credited to the firm, which by this time had assumed its more familiar name of E. and T. H. Anthony & Company, when a few years later Henry Anthony made what is believed to be the first "instantaneous" photograph or snapshot ever made.

It was during this period that the wet collodion process began to displace the daguerreotype. The inconveniences presented by the process—that plates had to be coated immediately before use, exposed while wet, and developed immediately thereafter—were in a great measure offset by the fact that shorter exposures and the making of extra paper prints were made possible. This opened vast new possibilities to photography, and it was only natural that the Anthonys should enter the field of supplying collodion plate materials.



The Cradle of Agfa-Ansco—1842



*Union Battery,
Ft. Lyon—1863*

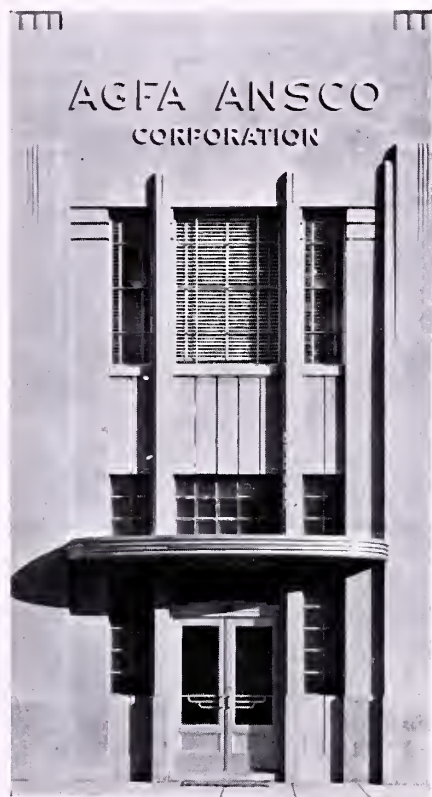
*Photographed by
Matthew Brady*

Most famous among the Anthony clients of those days was Matthew B. Brady, whose celebrated collection of photographs of the Civil War, made in the field with Anthony materials, was probably the first, and certainly the most famous of all camera war-reportages. Considering the handicaps faced even today by the men who follow battling armies with a camera, Brady's Civil War pictures made under all the handicaps of the cumbersome wet-plate process, are still unequalled. Not only did he have to carry with him the bulky camera equipment of the period, but in addition his equipment must serve as a miniature plate-factory and, of course, as a darkroom for the immediate development of his pictures. All told, he had to burden himself with an assortment of camera and laboratory equipment which would today be a load for a fair-sized truck!

But by 1880 the vastly simpler gelatin dry plate process had been introduced, thus bringing photography closer to its modern stage, and the first Anthony dry plates were introduced, followed four years later by the first Anthony (plate) hand camera.

First Celluloid Film

In 1837 the Anthonys were associated in a development, the importance of which is exceeded only by the original invention of photography itself. This was the invention of celluloid-based photographic film, which not only freed photography from the restrictions imposed by bulky, breakable glass plates, but which at a single stroke made the motion picture possible. From the very earliest days of photography, the limitations of Daguerre's metal plates and St. Victor's glass plates had been realized. Oiled and waxed paper, and a thousand other supports had been tried and found wanting. Photographic re-



*Entrance to Agfa-Ansco
Administration Building—1939*

searchers, especially those striving for the photographic reproduction of motion pictures, knew that success awaited only the appearance of a light, flexible and transparent support for their picture-making emulsions.

Finally, in 1887, the Reverend Hannibal Goodwin announced and patented his invention of celluloid-based photographic film.

This history-making clergyman was a photographic enthusiast who, during the course of his experiments, frequently consulted with the Anthonys. It was only natural, then, that when his invention was perfected, he should assign the manufacturing rights to the Anthony organization, and that the first photographic film should be marketed as an Anthony product.

The Birth of Ansco

It was during this same period that death terminated the activities of the firm's founders, Edward and Henry T. Anthony, leaving the leadership of the organization to Edward Anthony's son Richard. Under his direction the firm allied itself with another pioneer photographic house, the Scovill Manufacturing Company, of Waterbury, Connecticut.



Fifty years' progress—The head of the Agfa-Ansco camera plant compares a camera he designed for Scovill & Adams in 1888 with the 1939 Agfa Memo.

This latter firm had been manufacturing metal products since 1802, and entered the photographic field in 1842 as a manufacturer of Daguerreotype plates in a photographic division which ultimately became the thriving Scovill & Adams camera manufactory.

In 1902, Anthony & Company combined resources with the Scovill & Adams firm to form the Anthony & Scovill Company, a name which a few years later was officially abbreviated to the familiar Ansco, in which *An* represented Anthony, and *sco* Scovill. At this time, too, the firm's main manufacturing activities were centralized in Binghamton, New York, where they still remain.

During the decades that followed, the Ansco Company concentrated its activities upon the manufacture of film, papers, chemicals and cameras for professional and amateur still photographers. In this field the firm speedily established itself as a maker of quality materials and equipment. The firm's leadership in the professional field was even more clearly defined; in many a professional studio today Ansco professional cameras are still in use, unsurpassed by newer instruments.

The firm has remained basically unchanged since then, the only further change occurring in 1928 when the Ansco Company was merged with the American interests of the well known Agfa Film organization, a merger which created the present name, Agfa-Ansco. This merger united added technical skill of the most advanced photographic chemists with a priceless experience accumulated through many years of photographic manufacturing.

Since then, this pioneer American

firm has achieved universal recognition as a leader in American photography. Among professional portrait, illustrative and news photographers Agfa-Ansco cameras and materials have gained acceptance as the finest and most dependable money can buy. In every exhibition or published collection of many of America's most notable professional photographs, those made on Agfa-Ansco materials rank dominantly both in numbers and quality. Among America's millions of amateurs, the same is true, for both the advanced amateur and the box-camera snapshotter recognize the quality and dependability which made it safe for the firm to pledge with every roll of film sold the unequivocal guarantee of "Pictures that satisfy or a new roll free!"

Agfa-Ansco in the Raw-Stock Field

Achieving this leadership was not a simple matter of offering a merely good product, and trusting the world to beat a pathway to the firm's door. Leadership today must be won by offering a distinctly better product—one offering provable advantages over anything in the field. Following this policy, Agfa-Ansco bettered the orthochromatic rollfilms and packs, then virtually the only amateur material available, with the introduction of Plenachrome, a faster, more highly color-sensitive emulsion that gave a new conception of latitude and dependability. Soon after, they presented some of the earliest American offerings of super-panchromatic roll film for the amateur, and later the fine-grained Finopan. The success of these films is well attested by a recent nation-wide amateur contest in which out of a group of slightly over 200 prints either winning prizes or accept-



Agfa Lake, being developed by the firm as a country club for Agfa-Ansco employees.

ed for exhibition, more than 160 including virtually all of the prize winners were identified as having been made on Agfa Plenachrome, Super Plenachrome, Finopan or Superpan.

The situation existing in the motion picture raw stock field was similar, though necessarily more exacting. This field was and is intensely competitive; no firm can expect success if it remains satisfied to offer a merely equally good film.

So Agfa-Ansco set out to discover in what way film stocks could be made better—and to make such improved materials an accomplished fact.

At the outset they realized that the keynote to such improvement must be a detailed understanding of what the Hollywood cameraman wanted—of what he thought would constitute a better film. As a matter of logically inevitable policy, an organization of experienced experts was established in Hollywood, and the policy of virtually taking Hollywood's cinematographers and technicians into partnership was commenced. It is a policy which cannot and will not be changed. These practical men are, after all, the ones who will use the product. It is their reputations which must fall or rise according to the merits of that product. Therefore the manufacturer



THE PICTURE-MAKER

Photographed by George Blaisdell

must, in all fairness, listen to their desires and suggestions and, insofar as is technically possible, give them film-products which answer their demands.

Infra-Red Pioneered

Thus while Agfa-Ansco continued to produce motion picture film products, the energies of the company, both in Hollywood and in Binghamton, were devoted to evolving new and better film products which would be of types which the cameraman considered as better, more desirable tools.

In 1936 the first fruits of this partnership with the industry appeared. This was Agfa Infra-Red film—the original Type A—which received a Technical Award from the Academy of Motion Picture Arts and Sciences. In addition to this welcome public recognition, the film had the more practical distinction of revolutionizing the industry's methods of making exterior night-effect scenes.

This, however, was only a start. One of the greatest advantages of the firm's policy of intimate cooperation with the practical men who use their film is that under it the consumer has an opportunity not only to outline what he wants in new products, but to tell the manufacturer what qualities would desirably improve existing ones. Such suggestions led to the development of Agfa Infra-Red negative, Type B, which added to the still new qualities of its predecessor increased shadow-speed and a gradational scale comparable to that of accepted panchromatic production films. These changes widened the usefulness of Infra-Red negative, permitting its use on a still greater range of night-effect scenes, and have not only broadened

the pictorial scope of cinematography, but have been the means of enabling the industry to make notable savings in production costs.

Pioneering Today's "Fast Films"

In December, 1939, Agfa-Ansco's progressive policies brought forth another and a greater photographic advancement when Agfa Supreme and Agfa Ultra-Speed Pan were announced. Up to that time it had been axiomatic that any further increases in film speed must be bought by sacrifices in grain-size and gradational quality. These films—especially Agfa Supreme—showed that this theory was false. Agfa Supreme is fully twice as fast as conventional supersensitive panchromatic negative, yet evidences even finer grain characteristics; Agfa Ultra-Speed Pan is three to four times as fast as conventional superpan types, yet shows only minor increases in grain-size.

This was definitely a new concept in film manufacture. From the practical cameraman's viewpoint, it represented a forward stride comparable only to the introduction of panchromatic film and possibly the later introduction of the earliest super-panchromatic types. It permits the cinematographer to obtain his normal effects with far less light than had hitherto been deemed possible, resulting in a marked saving in lighting equipment and current, with the pleasanter working conditions that follow a closer approach to visually normal illumination standards. The same advance can be turned to equally good use on special-process scenes or on extremely large sets by permitting the use of conventional illumination levels and



Behind the scenes in the Agfa-Ansco factory. Top—testing paper stock; center—inspecting positive film; bottom—assembling Agfa-Ansco cameras.

smaller lens-openings to obtain greater depth of field.

This advance was formally recognized by the Academy of Motion Picture Arts and Sciences a year ago, in March, 1938, when that organization's Board of Judges gave to the Agfa-Ansco Corporation its jealously guarded "Class 1" Award—the coveted golden statuette—for the development of these two films. Since the inauguration of the Academy Technical Awards in 1930, the Class 1 Award has been bestowed but three times previously—and only once for a development in the photographic film field. The importance of the achievement may be appreciated by the citation given by this conservative Board of Judges, which stated in part that "The Agfa-Ansco Corporation, in making available to the motion picture industry these two new panchromatic films . . . has provided a tool to obtain . . . high quality photographic results heretofore impossible . . . Thus the Agfa-Ansco Corporation has provided the motion picture industry with a product which increases the photographic quality of production and tends to lower lighting costs."

The extent to which Agfa pioneered today's "fast films" is perhaps best attested by the fact that it was not until almost a year later that the first competitive high-speed film product appeared.

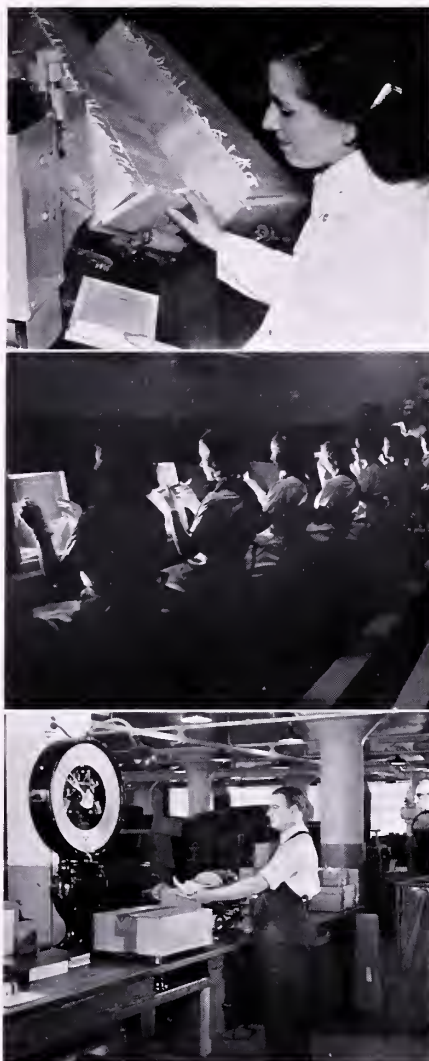
This brings up to date the record of Agfa-Ansco's achievements in the motion picture field. What achievements the future may hold can hardly be foretold. But the energetic spirit which gave birth to these present accomplishments cannot and does not

permit the firm's engineers to rest idly upon their laurels. Those who represent the firm on the Pacific Coast are continuing their efforts to discover just what additional types of film the practical men in the studios feel will be most desirable and useful. The engineering staff in Binghamton are continuing their unceasing efforts to translate those desires into the tangible form of improved film types. Three of the studios' major needs have already been met—and met supremely well—with Agfa Infra-Red, Agfa Supreme, and Agfa Ultra-Speed Pan. It can be taken for granted that the men who created these films are in the same way bending every effort to assure that the industry's other present and future needs will be met as brilliantly with products bearing the familiar Agfa diamond.

The Factory Behind the Film

But this purely historical sketch of the growth of the Agfa-Ansco Corporation cannot be closed without some record of the plant behind the product. We have seen how the product itself has advanced from the Daguerreotype days when, as Daguerre stated a hundred years ago, "the time required to procure a photographic copy of a landscape" was "from seven to eight hours," up to the present sensitivity of Agfa Ultra-Speed Pan which permits snapshot exposures with relatively slow lenses under ordinary room lighting and, granting the same scene and lens-opening referred to by Daguerre, would call for an exposure of less than 1/200th second.

In the same way the Agfa-Ansco Corporation has, like many another typical American enterprise, grown from a tiny upstairs shop on lower



A few of the people behind Agfa-Ansco products. Top—labeling cut film cartons; center—inspection of cut film; bottom—weighing one of the thousands of packages shipped daily.

Broadway, New York, to a huge factory in Binghamton, located in York State, about 200 miles from the metropolis. From the tiny staff of Edward Anthony's first shop, the personnel has grown to comprise nearly 3000 typical American working men

and women of all the heterogeneous mixture of races and creeds which have made America famous as the world's melting-pot.

Here, rubbing elbows as they go about their daily duties may be found youthful graduates fresh from America's leading technical colleges, and experienced oldsters who began their professional careers forty, fifty or more years ago with the still-remembered Anthony or Scovill firms—watching their children grow up to places in the same matured enterprise which has given the parents not merely a job but a lifetime career. Beside these are the thousands of others—men and women alike: trained research scientists and equally skilled film-makers, mechanics, inspectors, paper-makers, and opticians, and all of the hundred-and-one skills and crafts that are called on in the making of modern film, sensitized papers, chemicals and cameras. Unseen behind them stand an army of farmers from the Southern states from whence come the tons of cotton used annually for making the celluloid film-base; lumbermen from the North which produces the raw material for paper; miners from the Western mines which supply the tons of silver used to make film and paper light-sensitive.

Today Agfa-Ansco moves on, a representative American organization with a keen realization of its responsibilities, not only to the public which buys its products, but to the thousands of American workers who depend upon Agfa-Ansco for their livelihood. Agfa-Ansco is happy to be able to provide for these thousands solid, year-round employment. Equally proud, too, is Agfa-Ansco of the traditionally American spirit of friendliness—of helpful cooperation which has always existed between the management and every employee, great or humble. Throughout every department there is abundant evidence not merely of individual pride in the individual job, but of brimming enthusiasm for Agfa-Ansco and Agfa-Ansco's pledged obligation to produce the best products in its field that can be made.

Old and yet young—looking back upon nearly a century of accomplishment—Agfa-Ansco is an outstanding example of the American spirit of growth and progress, faithful to the ideals of its founders and to their progressive spirit, as well. Agfa-Ansco is proud of the part it has played in the past and present history of American photography, and looks eagerly forward to the future and to what that future will bring.



The Graininess of Photographic Emulsions

by

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The following instalment supplements three previous articles in this journal which describe the nature, the effect, and the measurement of the graininess of photographic emulsions. In Part III the construction of an instrument for the objective determination and analysis of this property of the emulsion by means of the graininess meter has been described, which has been constructed at the California Institute of Technology with the aid of the Agfa Ansco Research Fund. This instrument has, meanwhile, been applied to the analysis of various types of emulsions. Some of the results obtained shall be described and discussed as follows.

Part IV.

The Graininess of Different Emulsion Types

IT has been shown previously that the graininess constant G was chosen in such a manner that its values can be expected to be representative of the subjective impression of inhomogeneity realized by the observer of a sufficiently large section of a photographic emulsion. The subjective impression as such, of course, varies with the observer, with the nature of the optical system for observation, with the color of light, etc.

It is thus rather interesting to compare the graininess records obtained from different types of emulsions with each other as well as with the subjective impression gained from it. This purpose requires the comparison of different emulsions under approximately the same density as the graininess is known to vary considerably with the number of grains in the emulsion.

Figs. 1-a to 1-f represent reproductions from graininess records of six different types of emulsions which are true representatives of negative and positive material used for professional and amateur purposes:

- a.) Material for lithographic reproductions (density: .46) $G=39$
- b.) Positive film (density: .47) $G=57$
- c.) Sound recording film (density: .50) $G=63$
- d.) Process emulsion for purpose of reproduction (density: .45) $G=59$
- e.) Panchromatic emulsion of medium sensitivity (density: .41) $G=93$
- f.) Panchromatic motion picture film of very high sensitivity (density: .47) $G=105^*$

* (The values of G are multiplied by the factor 1000 in order to avoid the use of decimals. This process is equivalent to an expression of relative

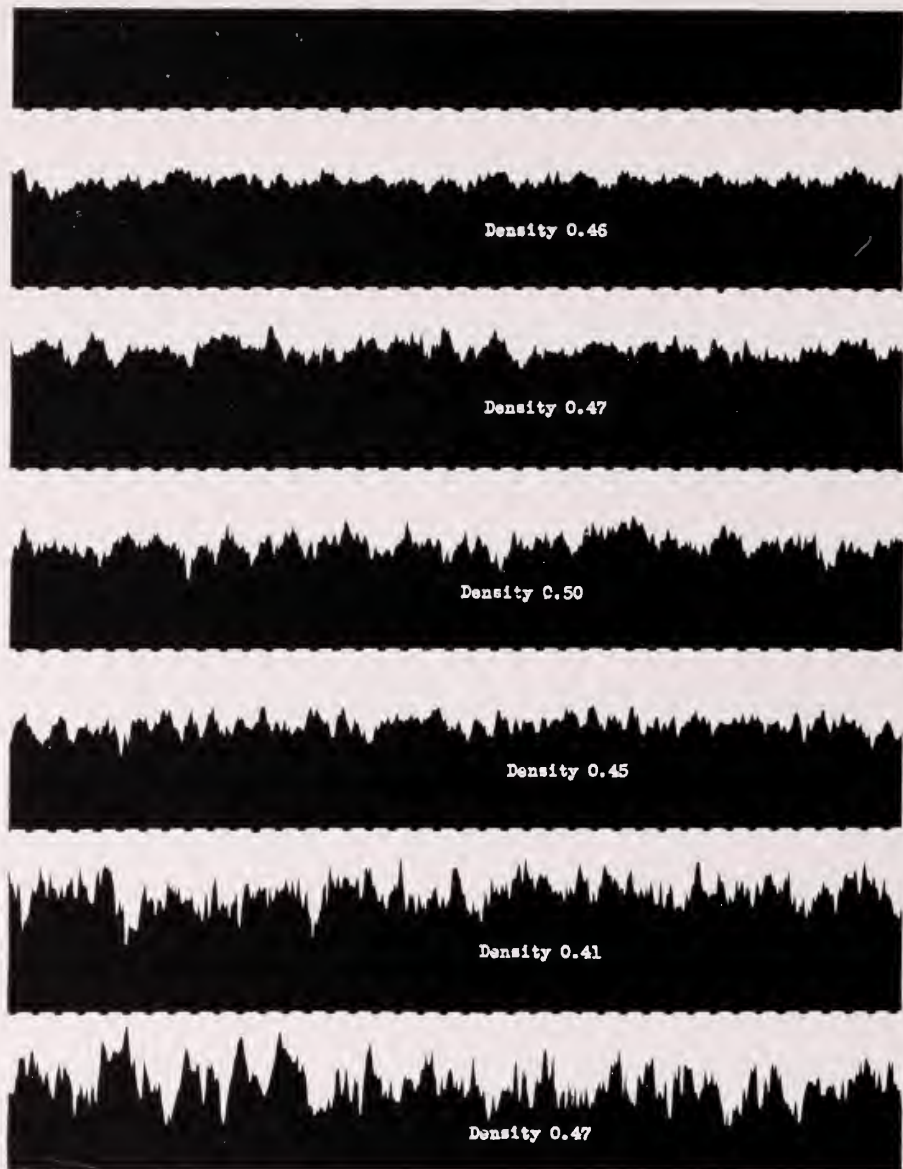
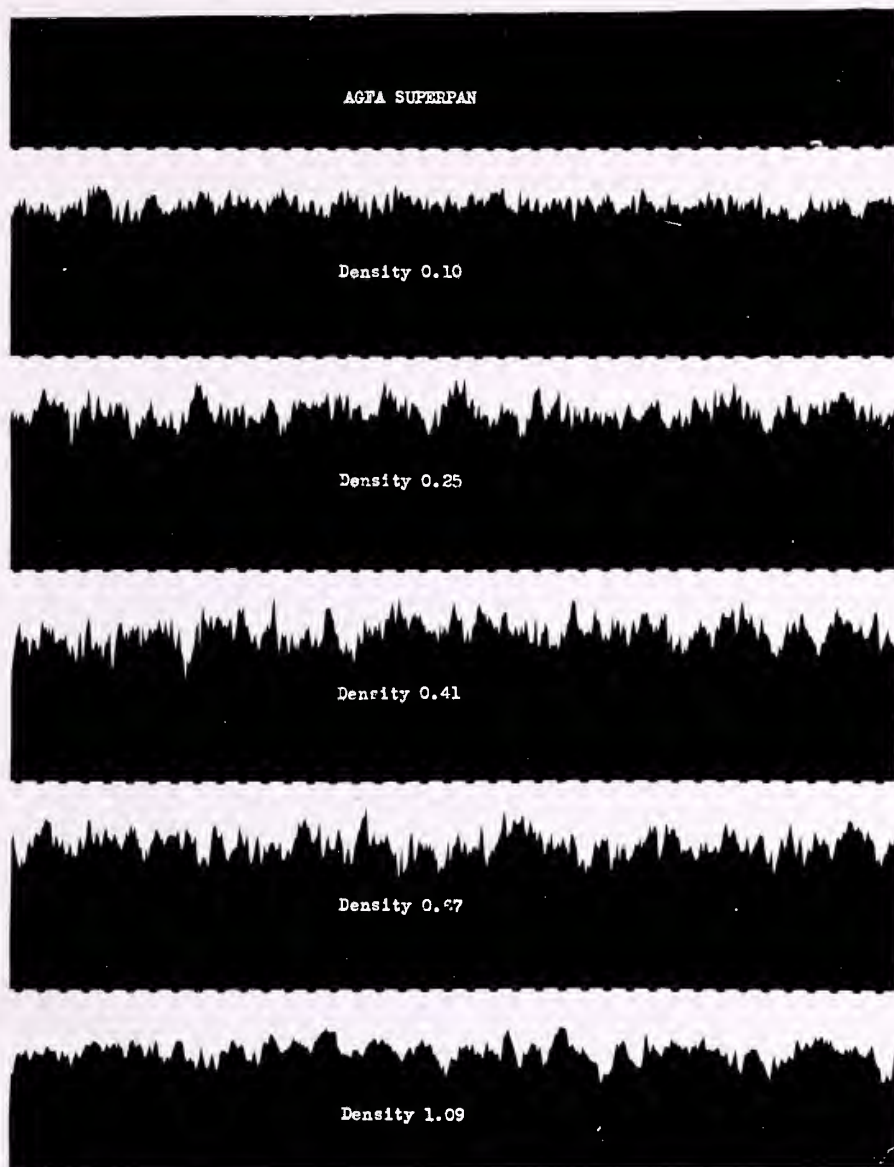


Fig. 1-a-f—Graininess records of different types of emulsions of approximately the same density. The records are arranged according to increasing sensitivity and graininess.

transparency fluctuation in per mil.)

The comparison of G-values shows that they agree qualitatively very well with the subjective experience. They demonstrate, however, a number of rather interesting facts at closer inspection.

From the previous description it is obvious that the smallest detail in a graininess record is equivalent to the size of a single grain and it is interesting to find on the records that the shape of the smallest detail varies considerably with the type of emulsion



Figs. 2-a - 2-e—Graininess records of the same emulsion for different densities.

inasmuch it is of almost equal size in 1a, 1b, 1c, and is considerably larger in the last two emulsions of known large granularity (average grain size). The first three emulsions show, in spite of an approximate equal grain size, considerable variations in

the size of the fluctuations, i. e. in graininess. Furthermore, it appears that apart from granularity and graininess, each emulsion possesses a rather characteristic *shape* of an average fluctuation which indicates that in different emulsions the grains group

themselves in a more or less typical fashion. The fluctuations of all emulsions were found to obey the probability law sufficiently well so that the G-value is descriptive of the occurrence of *small* as well as *large* fluctuations.

The records in Fig. 1 demonstrate moreover that the graininess increases with increasing sensitivity, for the emulsions are arranged in the order of their sensitivity properties. Experience in other emulsions shows, however, that this is not necessarily true as in recent years a number of fairly high sensitivity emulsions have been produced the graininess of which is very small (e. g. Agfa Finopan).

From previous discussions of the graininess problem it is obvious that the graininess must depend upon the density of the emulsion because the probability for the occurrence of a fluctuation depends naturally upon the number of grains present so that one should expect a larger graininess for a larger photographic density of the same emulsion. This dependence of the graininess upon the density is demonstrated in Figs. 2a - 2e, where samples of the same emulsion (Agfa Superpan) have been analyzed for 5 different densities. The data resulting are the following ones:

- a.) Density: .10, $G=58$
- b.) " " .25, $G=75$
- c.) " " .41, $G=93$
- d.) " " .67, $G=92$
- e.) " " 1.09, $G=57$

Fig. 3 represents these results in a diagrammatic form where the graininess is plotted versus the density and it is shown that the graininess has a maximum in the density range of .4—3 which is in very good agreement

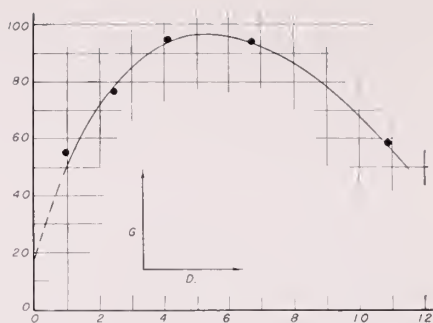


Fig. 3—Graininess versus density for a panchromatic emulsion (same as Fig. 2). The curve demonstrates the maximum of graininess for medium densities and the decline towards larger densities. The dashed part of the curve is an arbitrary extrapolation and does take into account the graininess due to base, gelatin, and fog.

with the visual impression of inhomogeneity. It is a well known experience to every one familiar with photography that the regions of low and high density in a photographic negative are of a much more homogeneous character when projected, than the medium densities.

Close inspection of the records (Figs. 2a - 2d) reveals, however, another very interesting fact: It has been mentioned above that the width of the smallest detail of the recorded pattern is indicative of the size of the individual grain (granularity). The records show, in fact, that the width is practically unaffected by the density, demonstrating that it does not affect greatly the size of the individual grain. The variation of the graininess with different densities is due to the fact that the size of the fluctuations increases considerably, in other words, the occurrence of large fluctuations increases with the number of grains present. This behavior is somewhat reversed for very high densities (Fig. 2d) where the grains begin to "overlap" which fact is indicated by

the occurrence of very broad fluctuations which then produce a result in the decrease of the graininess.

The graininess dependence on density as shown in Fig. 3 is extrapolated for densities less than .1 (indicated by the dashed part of the curve). Although one should expect no graininess in the absence of grains (i.e. for $D=0$) experience shows that a considerable inhomogeneity remains under such conditions. This is partly due to the celluloid base

(this effect is almost absent in glass), in the inhomogeneity of the gelatine, and in the fog. Thus, the graininess produced by these three factors can be estimated, depending on the conditions, to be between 15 and 30 so that the effect of base, gelatine, and fog can easily produce 30 per cent to 50 per cent of the graininess of a fine grain emulsion at low densities.

One may be induced to conclude from what has been said above that the graininess is an absolute quantity

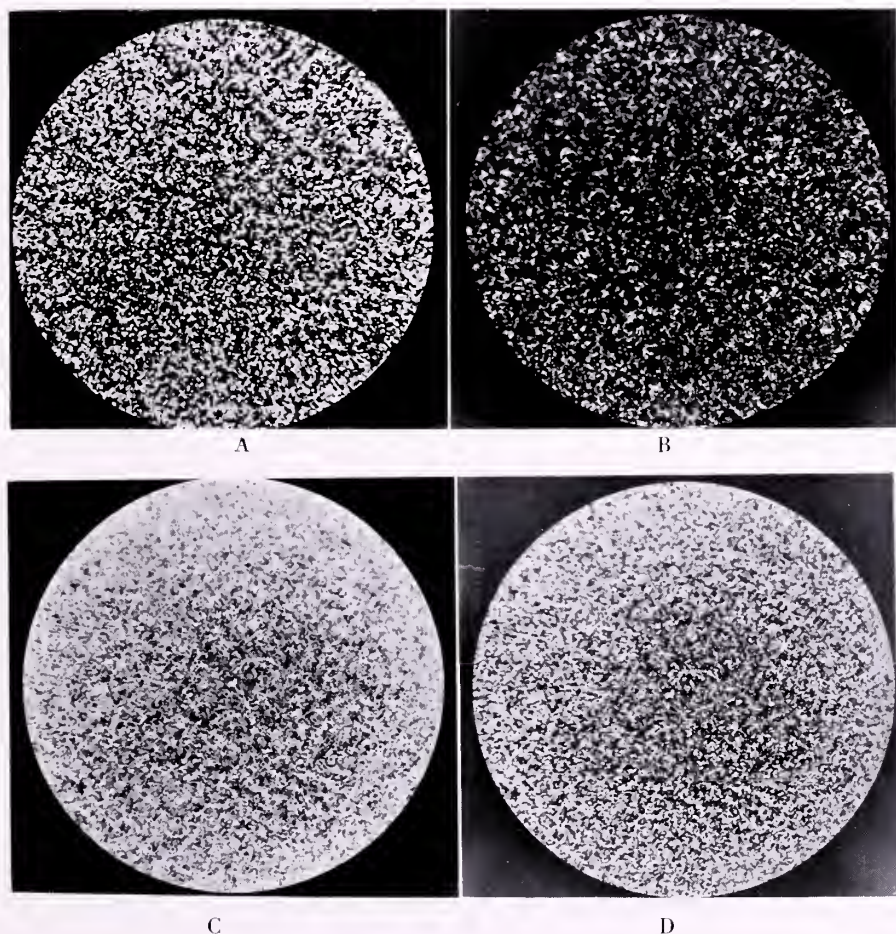


Fig. 4a-4d—Microphotographs of two different emulsions of similar densities of large (a, b above) and small (c, d) graininess seen under large (a and c) and small (b and d) aperture. A and b, and c and d are taken from an identical region of each of two emulsions. The photographs demonstrate the increase of the graininess impression when observed with small aperture and vice versa, due to the scattering of the illuminating light within the emulsion.

for a given emulsion of a certain density. This is, of course, true as long as the emulsion is observed under the same optical conditions. If these are changed, however, the impression caused by the graininess will change also and—for certain types of emulsions—to an amazingly large degree. If, for instance, an emulsion is projected through an optical system of small aperture, the resulting graininess will appear different from the impression gained when a system of large aperture is employed.

Figs. 1a to 1d illustrate this effect: Two emulsions were chosen, one of large (*a* and *b*) and one of small (*c* and *d*) graininess, however, of approximately the same density. Each emulsion was photographed twice through a microscope at a magnification of 335 diam. and care was taken that exactly the same section of the emulsion was used so that *a* and *b*, and *c* and *d* are identical each, as far as the arrangement of the grains is concerned. The difference between *a* and *b*, and *c* and *d* respectively consists only in the aperture of the illuminating and observing system in which respect *a* and *c*, and *b* and *d* are identical. The difference between both pairs consists, thus, only in the fact that the aperture for *a* and *c* was larger than for *b* and *d* approximately 5x. In spite of the fact that the type of optics, focal length, magnification and emulsion region are identical, it is obvious that the graininess impression received from *b* and *d* is considerably larger than that of *a* and *c* respectively. The difference in aperture means, in this case, that the images of *a* and *c* were produced by light coming from a wide angle, whereas, *b* and *d* were produced

from a small angle, i. e. from almost parallel light.

The physical reason for this phenomenon is due to the scattering of light on the grains within the emulsion which results in a decrease of contrast at the border of each grain, resulting at the same time in a decrease of optical definition. The wider the angle under which the emulsion is illuminated and observed, the larger is, of course, the amount of scattered light received by the optical system and vice versa.

In the practical use of photographic emulsions the aperture of the optical system employed varies considerably depending on the particular purpose, e. g., for the use of projecting a microscopic image of the sound track upon the photo-cell in sound reproduction, the aperture is very large, whereas objectives of small aperture are used in general for the projection upon the screen. Hence, for the same emulsion, different values of graininess will have to be used with regard to the final purpose of the emulsion.

The problems connected with graininess, as outlined above very briefly, are by far not the only ones in this field, as for instance the question to what extent the graininess of a negative determines the graininess of a positive made from it,—the question to what extent the graininess of a given emulsion depends on its gamma and the relation between the color of the light by which an emulsion is projected—, play a large role in a field in which, due to lack of an instrument for the objective determination of the graininess, little research has been done in the past. In the next instalment more of these questions shall be discussed in detail.

The Practical Relationship Between Gamma and Visual Contrast

By S. D. LUND
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EVERY industry has at one time or another undergone changes brought about by the application of new principles or inventions. In the case of the motion picture, such a change took place when sound, and especially film-recorded sound, was introduced.

One of the most significant of these changes was in the field of laboratory processing methods. The necessity for faithful sound reproduction—the fact that the photographic quality of the sound-track print must be an exact replica of that of the sound negative if good sound is to be heard—caused a major revolution in the methods of the industry's film-processing laboratories. The rather loose methods which had previously sufficed, based as they were largely on visual inspection and personal skill and judgement, were not sufficiently accurate for this purpose, and as a result the more accurate methods of sensitometric control were substituted.

This brought a host of new and hitherto unfamiliar technical terms and phrases into the picture. Some of them still seem perplexing and unnecessarily complicated to many cinematographers, since they seem in some

cases to substitute new and complex values for the terms with which the industry grew up. It is the purpose of this article to attempt a simple translation of some of them into the more familiar terms of everyday photographic practice.

Chief among these terms are cryptic references to "the H. & D. Curve" and to "Gamma."

Basically, these are simple enough, if one will simply consider the former as a sketch-map of the latitude and contrast characteristics of a film, and the latter as a numerical expression of contrast.

Every practical photographer knows from experience that with any type of film there is a definite relation between the exposure given and the density produced. Within certain limits, an increase in exposure brings a corresponding increase in density. But in the very low exposure ranges, and in the very high exposure ranges, this does not hold good. In the low region, that is, in the extreme lowest shadows, the exposure has to increase a lot to make a relatively small increase in density. In the very high region—the extreme "hottest" highlights—most

films seem to build up to a definite maximum density and then stop, no matter how greatly exposure increases.

The H. and D. Curve

The H. & D. curve which owes its name to two English experimenters, Hurter and Driffield, is simply a picture of this. If you plot this relation as a curve, with increases in exposure indicated by the distance to the right of a common starting-point, and increases in density as the elevation of the curve above that starting-point, you will find, in the low-exposure-low-density region, that your line curves upward very slowly. In the normal region, where exposure and density increase about proportionally, you will have a practically straight, upward-slanting line. In the extreme high-exposure-maximum-density region, your curve will flatten off, moving to the right, to indicate increased exposure, but not climbing much, since there is little or no increase in density.

Technically, the bottom of this curve is naturally called the "toe," and the flattened top, the "shoulder." The slanting middle portion is logically called the "straight-line portion".

Now if we plot these curves for two types of film, one very contrasty, the other very flat, we'll get, in one case, a line that slants up at a very sharp angle, and in the other, one that slants at a much flatter angle. In the same way, hard and soft development of the same film, giving contrasty or soft results, will give us similarly steep or flat inclines. We can quite accurately compare the contrast of the results by mentioning the angle of these slants. That, though expressed as the result of a more in-

volved mathematical formula, is the simple meaning of "Gamma."

Gamma

The now familiar sensitometric or "gamma" strips are the means by which we get the facts for plotting these curves. One end of the strip gets very little exposure; the other end, an extremely high exposure. The rest of the strip gets varied intermediate exposures, ranging by progressive and accurately known steps from high to low. So the strip itself is a graduated range of densities from virtually clear film at one end to virtually opaque film at the other.

Clearly, if we cut down the total exposure of the strip, several of the light-exposure gradations are going to be underexposed, and will merge into each other, while the high-exposure end will fall short of getting full exposure. If, on the other hand, we give too much exposure, the normally light end of the strip is going to pick up more exposure than it should, while several of the steps at the top end of the strip will all be overexposed to the maximum the film permits, and will crowd together in a single, heavy density.

What we're doing is simply this: in a normally exposed strip, we're using not only the full length of the strip and the full gradational scale of the film, but we're using the whole straight-line portion of the film's curve.

If we underexpose we're lowering the gradational scale into the toe of the curve; if we overexpose, we're ignoring the toe, losing much of the lower straight-line portion, and causing the gradational scale to be crowded

up into the shoulder section of the curve.

Naturally we can get very similar results with over- or under-development. As a matter of fact, the "gamma strips" used in laboratories today are all given an accurately standardized, normal exposure. Then the deviations from normal densities in the different steps will serve as a measurement of the development. These methods are equally useful with negative or positive film.

Practical Application

While all of this has a most obvious connection with laboratory work, it has also an important relationship to the everyday work of the practical cinematographer.

Speaking generally, it is the cinematographer's aim to produce in monochrome as natural a rendition of the scene as possible. For this, he finds it best to utilize the full gradational range of the film material he is using, in order to have available not only the extremes of highlight and shadow, but the fullest range of delicate intermediate tones. In addition, for obvious practical reasons he will get the best results when he knows that all of his gradations in lighting—which is to say gradations in the exposure of all of the details of his scene—will be represented by directly proportional gradations in the tonal values of his picture.

In scientific terms, this means that he must utilize the region of his film's sensitivity in which exposure-values and density increase proportionately—that is, the straight-line portion of the H. & D. curve. For faithful reproduction, this must be true not only of the negative, but of the positive as

well. This gives him what we like to call a normal result.

At times, of course, strictly normal results may not be wanted, as in scenes which for dramatic reasons require strong, contrasty treatment or, on the other extreme, extremely flat treatment. The same results, as most of us have at some time or other learned to our sorrow, can be produced unintentionally through errors in lighting, exposure or laboratory treatment.

Illustrating Gamma

To demonstrate these points in a practical way, the accompanying illustrations were made from photographic tests, showing the visual and sensitometric effects of both normal and distorted lightings. A wax figure head was used for the sake of uniformity. The lightings were simplified approximations of normal, of over-flat and of ultra-contrasty close-up lightings. A sensitometric or gamma strip was made on the same roll of film as each of the negatives used for illustration, and corresponding positive strips were made from these. The strips were made with a standard sensitometer, and their densities read with a standard densitometer. The curves obtained from the negative and positive strips were plotted in the usual manner.

In order to bring out the very practical relationship between sensitometric values, densitometric readings were taken on opposite sides of the face—the cheek-bones, to the precise—in both the negative and the positive. These, in turn have in the illustrations been connected by the solid lines to the respectively corresponding densities in the sensito-

metric strip, and to the corresponding points in the plotted negative and positive curves.

In Figure I, which incidentally was made with perhaps a more delicate gradation between the highlight and shadow sides than would be the case in normal cinematography, as it was wished to guard against any possible accidental debasing of tonal values in the reproduction, it will be seen that the range of densities represented by these key gradations fall well within the straight-line portion of the corresponding curves. In other words, a photographer working in such a normal technique assures himself of a normal result on the screen, since he is working, both in his negative and in the positive film upon which it is printed, in that region of his film's characteristics where the response is normal, giving a normal and proportionate increase in density with increased illumination.

Figure II is a reproduction of an excessively flat type of lighting, in which very little separation is evident. The same areas on the subject—the two cheek-bones—were read and their corresponding densities on the sensitometric strip and the positions of these on the H. & D. curves were indicated as before. It will be obvious that in such a shot we are making use of only an extremely restricted portion of the film's latitude or tonal range. What we are using is, however, well in the center of the straight-line portion, and the reproduction of such gradations of lighting as may exist in the limited range used may be reproduced as proportional gradations in photographic density.

Figure III reproduces a lighting of extreme exaggerated contrast. This

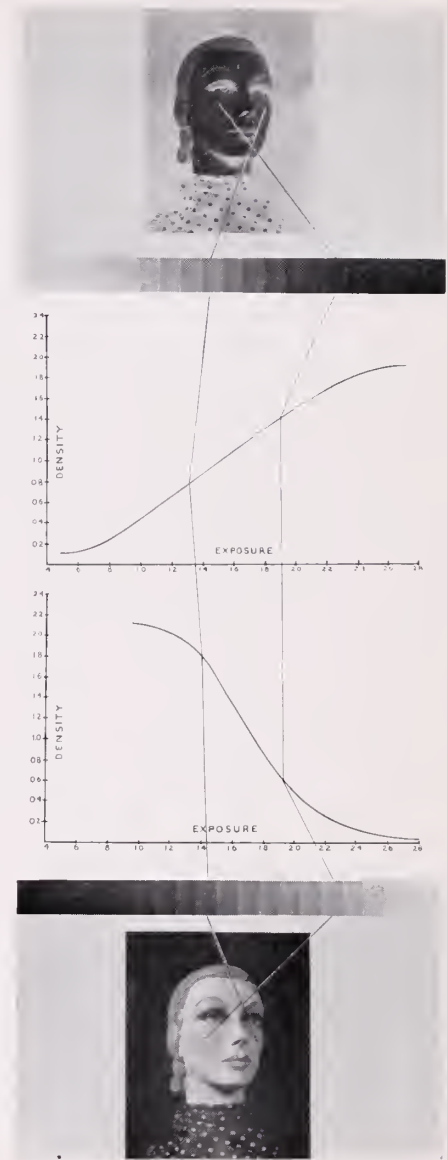


FIGURE I.

exhibits a complete distortion of the normally desirable range, running instead from extremely strong highlights to empty shadows. Its response spreads dangerously over the scale, extending not only throughout the straight-line portion, but crowding perilously into both the toe and the shoulder of the

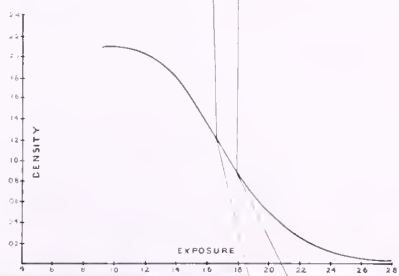
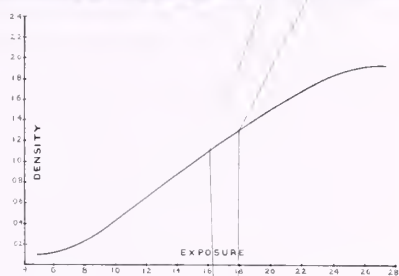


FIGURE II.

curve. The extremes of lighting are in this instance carried into the ranges where increases or decreases in visual illumination are no longer always accompanied by corresponding increases or decreases in photographic density. In addition, such exposures can frequently fall beyond the reproductive

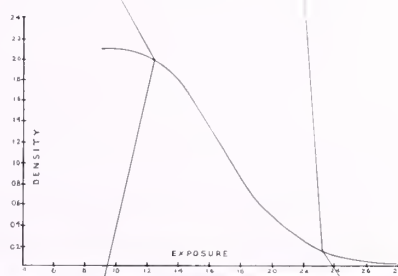
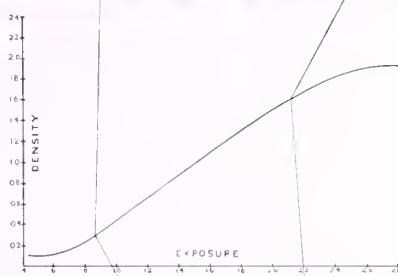
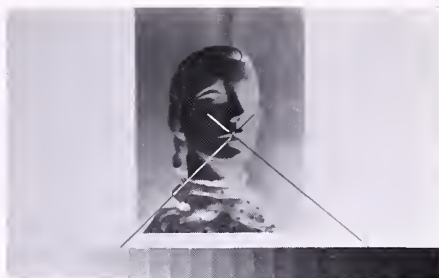


FIGURE III.

and control limits of the positive printing materials and process.

It is hoped that the above may help practical cinematographers to correlate the pictorial results they seek with the necessary control methods and technical terms employed in the modern laboratory.



SAN FRANCISCO FAIR—PACIFIC HOUSE

Photographed by Mike Roberts

S.M.P.E. Convention in Hollywood

As we go to press, the program for the 1939 Spring Convention of the Society of Motion Picture Engineers has just been made public, and includes a number of papers and demonstrations of worthwhile interest. The convention will be held in Hollywood from Monday, April 17 to Friday, April 21. The majority of the sessions will be held in the Blossom Room of the Hollywood Roosevelt Hotel, but two special evening sessions, planned especially in the interests of studio workers who cannot leave set or office during the daytime sessions, are scheduled to be held in the Filmarte Theatre on the evenings of Tuesday, April 18 and Wednesday, April 19.

Highlights of the program, from the viewpoint of the practical cinematographer and laboratory man include the following papers: *The Status of Lens Making In America*, by Dr. W. B. Rayton, A.S.C., of Bausch & Lomb, at the 2 P. M. afternoon session on Monday, in the Roosevelt's Blossom Room.

New Frontiers of the Documentary Film, by A. A. Mercey, U. S. Film Service, at the same session.

The Time Telescope, by C. R. Veber of Rutgers University, on the same afternoon.

The evening session on Monday, April 17, at the Roosevelt, while primarily devoted to sound, features a paper on *Special Effects*, by L. Witte, of 20th Century-Fox.

The session on Tuesday morning, April 18, at the Blossom Room, while devoted primarily to 16 mm. and projection problems, schedules several papers which should be of interest to anyone interested in 16 mm.

Tuesday night's session at the Filmarte Theatre, at 8 P. M., should be particularly well attended by Hollywood's camera group. The papers scheduled include:

Fluorescent Lamps and Their Application to Motion Picture Studio Lighting, by G. E. Inman and W. H. Robinson, Jr., of the General Electric Co.

The Present Technical Status of 16 mm. Sound-on-film, by J. A. Maurer of the Berndt-Maurer Corp.

Methods of Using and Coordinating Photoelectric Exposure Meters at the 20th Century-Fox Studio, by Dan B. Clark, A.S.C.

Thursday, April 20 opens with a morning session at the Blossom Room (10 A. M.) devoted to laboratory and photographic matters. The papers include:

An Instrument for the Absolute Measurement of the Graininess of Photographic Emulsions, by Drs. A. Goetz, W. O. Gould and A. Dember of the California Institute of Technology, a demonstration of the graininess meter described in these columns, and developed under the Agfa-Ausco Research Fund.

Some Factors Governing the Design, Construction and Operation of a Motion Picture Laboratory, the report of the Committee on Laboratory Practice, by D. E. Hyndman, Chairman.

Simplifying and Controlling Film Travel Through a Developing Machine, by J. F. Van Leuven of the Fonda Machinery Co.

Warner Brothers' Laboratory, by Fred Gage, A.S.C.

Studio practice highlights the session at 2:30 P.M. on Friday, April 21. The papers include:

Recent Improvements in Carbons for Motion Picture Set Lighting, by D. B. Joy, W. W. Lozier and R. J. Zavetsky, of the National Carbon Co.

Report of the Studio Lighting Committee, by W. C. Handley, Chairman.

Remarks on the Work of the Research Council Process Projection Equipment Committee, by Farciot Edouart, A.S.C.

Carbons for Rear Projection in Motion Picture Studios, by D. B. Joy, W. W. Lozier and M. R. Null of the National Carbon Co.

The 20th Century Silent Camera, by Grover Laube, of 20th Century-Fox. *Flicker In Motion Pictures*, by L. D. Grignon, of Paramount.

The Friday evening session, at 8 P.M. in the Blossom Room should be a definite highlight, as it is devoted wholly to television. Its papers, all by recognized experts in practical television, including several of NBC's television aces, cover such practical points as the use of motion picture film in television, television studio technique and television lighting.

In addition there will be at the Roosevelt, throughout the convention, a display of the latest equipment and an exhibition of the latest in color stills from the nation's leading color still men, collected by O. O. Ceccarini, of MGM, who is an outstanding authority on color stills. Recalling the exhibit Ceccarini collected for the convention two years ago, this is something no cameraman should miss!

The S. M. P. E. extends a cordial invitation to all studio people to visit and take part in this convention—a privilege which is well worth accepting.



TREASURE ISLAND

Photographed by Mike Roberts

Our Illustrations

As we were beginning to lay plans for the pictorial illustrations to go into this issue of AGFA MOTION PICTURE TOPICS, two of our camera-wielding friends reminded us that San Francisco is holding forth on "Treasure Island" with a remarkably photogenic World's Fair. What's more, their reminders took the practical form of two groups of pictures of such spectacular appeal that selecting the best prints to use became a major problem!

The title-page of this issue is adorned with one of these prints, "Jewels of the Night," from the trusty minicam of *Franklin S. Allen*, Los Angeles Manager of *The American Weekly*. Following the example of so

many of America's "ace" news lensers, *Allen* sees to it that his camera is loaded with Agfa films whenever he exercises his photographic hobby. Agfa Supreme was his choice this time. The exposure, 1/50 second at f:1.5.

The striking night shot of the "Tower of the Sun" which forms our frontispiece is the work of *Mike Roberts* of the commercial photographic studio of *Roberts & Roberts*, of Oakland. It furnishes excellent evidence why he and his studio rank so high among the camera artists of the northern metropolis.

From his camera, too, came other pictures of the pictorial highlights of the Fair, reproduced on pages 5 and

28, as well as the striking aerial shot of "Treasure Island" at the top of Page 31. "All of them," he tells us, "were made on Agfa Superpan Press, which since its introduction has been the only film we use."

"The Picture-Maker," on page 12, was snapped by *George Blaisdell*, Editor of *The American Cinematographer* while spending a quiet Saturday afternoon of desert picture-making. "Agfa Superpan Press," he tells us, "with a 29-F filter. Exposure by Weston." And, we might add, a picture of which any cinematographer might be proud!

Many people have asked us who photographed the spectacular composition of billowing yacht sails used as the frontispiece of our last issue. Unfortunately the print came to us with no credit data. We've since found the credit is due to *Morris Rosenfeld*, to whom we apologize for this unavoidable slight.

* * *

You Might Like to Know---

A new illustrated 36-page manual on Speed Flash Photography has just been published by the Kalart Co. It is one of the most comprehensive yet published on the subject, and should be of value to everyone interested in synchronized flash pictures, regardless of the type of synchronizing equipment they use.

Complete exposure charts for distance, stop and shutter speed for the various size flashbulbs, with exposure recommendations for all types of film, are among the practical features of manual.

Another practical table is that listing the intensity, flash duration, peak

duration and synchronizer adjustments for all of the generally available types of flashbulbs. Many users of flashbulbs will also find the information on testing for synchronism unusually helpful. Detailed information about using Kalart flash synchronizers with more than 30 of the most popular types of still and miniature cameras is given.

The booklet is free, and may be had from the Kalart Company's New York or Hollywood offices, or from most dealers.

New Agfa 16mm. Film

Users of 16mm. cameras will be interested to learn that a new Agfa 16mm. film is available in the moderate-price range. It is called Agfa Reversible Panchromatic, and we've found it to be an excellent fine-grained panchromatic film with a Weston daylight speed of about 14. It retails for \$4.50 per 100-foot daylight loading spool, and \$2.75 per 50-foot daylight loading spool. Processing at any of the seven Agfa 16mm. processing plants in the U. S. and Canada is included in the price of the film.

Filter Calculator

Faxon Dean, the popular camera-rentals specialist, has prepared for free distribution to the profession a handy, pocket-size filter and exposure calculator. It enables one to coordinate exposures for any combination of lens-stop, filter-factor, shutter opening or camera speed in less time than it takes to tell about it. On the reverse is a handy chart of filter-factors for the most popular studio films—including Agfa Supreme and Agfa Ultra-Speed Pan—with all commonly used filters.



Above All

Cinematographers rightly value quality and dependability in motion picture film products above all other things. These values are outstandingly evident in every inch of today's perfected Agfa motion picture films. In addition, Agfa-Ansco offers a variety of film types to meet every production requirement.

Agfa Supreme—the pioneer high-speed fine-grain production negative—is universally recognized as the finest production film in the field.

Agfa Infra-Red is unique for making convincing exterior night-effects by day, and for capturing spectacularly overcorrected day-effects.

Agfa Ultra-Speed Pan gives that extra margin of unrivalled speed which often means the difference between failure and success in special scenes under unfavorable lighting conditions.

All three conform to standards that place quality and dependability above all. Made by Agfa Ansco Corporation in Binghamton, New York.

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Motion Picture **TOPICS**

MAY-JUNE · 1939





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MOTION PICTURE TOPICS

WILLIAM STULL - A. S. C.

EDITOR

Contents

TIMELY TOPICS	2
FLYING HIGH WITH INFRA-RED By ELMER G. DYER, A.S.C.	5
TIME-AND-TEMPERATURE VS THE TEST SYSTEM FOR NEGATIVE DEVELOPMENT By IRVING MILLARD	11
MINICAM AERIAL STILLS TELL STORY OF "AMERICAN WEEKLY" CIRCULATION By FRANKLIN S. ALLEN	16
OUR ILLUSTRATIONS	20
INFRA-RED PICTURES LOS ANGELES THROUGH OBSERVATORY TELESCOPE By WILLIAM STULL, A.S.C.	21
PATHWAY TO THE STARS Copyright by Lyle Abbott	Frontispiece



SIERRA SUNSET

Photographed by Elmer G. Dyer, A.S.C.

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Timely Topics

ONE of the perpetually interesting things about editing a magazine like AGFA MOTION PICTURE TOPICS is the way one is constantly reminded that no two cinematographers face identical professional problems. Repeatedly, in casual chats with friends, some point has come up which to us seemed worthy of being put into print. Nine times out of ten, the friend will reply, "Oh, I don't think there's anything new to that—I've been doing it for months." But when the article has appeared, ten men in other studios (sometimes even men on the same lot!) will congratulate us for giving them a piece of new and helpful information! What is "old stuff" to one man may be to some fellow cinematographer the precise answer to a perplexing problem that has just arisen.

This magazine exists to further such constructive interchange of information. This isn't always as easy as it might seem, for we are so close to Agfa films and their use that we, too, can overlook things that perplex the other fellow. For that reason, we hope our readers will ask us questions—even questions which seem to them likely to be embarrassingly elementary. After all, circumstances have a great deal to do with what details a man learns about a film and its characteristics.

A cinematographer using Agfa Supreme for society dramas or musicals, with few if any exterior scenes, might easily expose hundreds of

thousands of feet of film before a location call would bring up questions a fellow cameraman making Westerns would have asked—and had answered—before starting his first day's shooting on the film. Neither of them might give a thought to characteristics of the same film which make it of value to the optical printer expert who uses it for duping.

In the same way, a man who makes routine night-effect shots on Agfa Infra-Red would rarely face the problems Elmer Dyer encounters when he takes the same film two or three miles above the earth in an airplane. And neither of them would ask some of the questions asked by Lyle Abbott, who photographs terrestrial views on Infra-Red through an astronomical telescope. Yet the answer to the questions of any one of them might be helpful to all three.

All of which shows why we are delighted when any of our readers ask us questions, or suggest an article he feels would be interesting. We want AGFA MOTION PICTURE TOPICS to be of practical value to those who read it, both when the issue is fresh off the press and later when, as so many do, they have filed it away as reference material.

* * *

ALL of us have at one time or another bemoaned the fact that, save in a rare few private homes to which most of us do not have entree, we whose daily bread is the cinema and its

advancement have no opportunity to screen either the epoch-making films of the past, whose influence has made our present work what it is, or the current product of foreign studios whose releases do not find their way into American theatres. That such a condition should exist in Hollywood, the world's film capitol, we all agreed, was lamentable. But nobody bothered to take practical action.

Today, somebody has. The Academy's Don Gledhill, in collaboration with several other equally progressive souls, last year formed the Southern California Film Society. This Society not only talks about such showings: it actually put them on. Its second season is now under way.

Every Friday, Saturday and Sunday night, usually at 8:30 P. M., in the Academy Review Theatre, 1455 North Gordon Street, there is a Film Society showing of a picture worth seeing. Among those scheduled to be seen this summer are Douglas Fairbanks' "The Mark of Zorro"; "Alas De Mi Patria" ("Wings of My Country"), a current spectacle of military aviation, made in Argentina; the pioneer impressionistic film, "The Cabinet of Dr. Caligari"; Rene Clair's "A Nous La Liberte"; "The Covered Wagon"; a complete evening of Mack Sennett's films, including "Molly-O," with Mabel Normand; the beautifully photographed "Passion of Joan of Arc," photographed almost exclusively in close-ups; the original "Beau Geste," with Ronald Colman; "Tumbleweeds," Wm. S. Hart's last film; and many others. Among those already shown have been Fritz Lang's "Metropolis"; Sergei Eisenstein's "Cruiser Potemkin"; and "Mientras

Mexico Duerme," the most popular Mexican-made film of 1938.

To anyone interested in motion pictures, not merely from an 'arty' standpoint, but from the more practical one of studying the other fellow's work to see why great pictures are great, the Film Society's program is extremely well worth supporting. We to whom making better pictures means bread and butter should support it generously. for study of such pictures—old and new—cannot fail to bring new ideas, new enthusiasm, and in the long run pay us cash dividends. It should be worth money to any of us.

Yet the cost of attending these sessions is ridiculously low. Academy members may attend without expense, though they are asked to pay a forty-cent admission charge for their guests. Others may obtain five admissions, to be used individually or together, for two dollars. The Film Society is doing something eminently worthwhile for the film industry. Those of us in the film industry should by all means support it.

* * *

THE trade papers frequently editorialize over the need of closer cooperation between the business heads of the film industry and its 'just around the corner' competitor, television. It is equally obvious that since both mediums tell stories visually—in pictures, with the aid of sound—cooperation of artistic minds is equally necessary.

But even more urgent, for many reasons, is cooperation between the two industries in interchange of technical ideas and personnel. It seems inevitable that the two must ultimate-

ly work hand in hand in many respects. Why, then, should television in its developmental stage be denied the benefit of the cinema's technical knowledge and experience?

Locally, the Don Lee system has started in the right direction, engaging Lynn Dunn, Cecil Love and several other studio cameramen and technicians to take full charge of their lighting and similar production problems. So far as we know, no other television group, in this country at least, has paralleled this progressive step by Don Lee's television chief, Harry Lubeke. We predict it will prove beneficial.

From the figures quoted in the papers presented at the closing session of the recent Convention of the Society of Motion Picture Engineers, it is obvious that television lighting is a far different proposition from lighting a motion picture scene for a modern film like Agfa Supreme, where key-light illumination levels of as low as 75 foot-candles are common. One paper stated that during the past six months, the lowest key-light level used by NBC in New York was over 300 foot-candles, and the highest just under 2500 foot-candles. Yet it was also brought out in discussion that on one occasion locally, when a main fuse blew out during a program, leaving only a single 500-watt lamp, wired to a different circuit, albeit, a discernible image was still televised.

In time we will probably see developments in television iconoscopes comparable to the advance in sensitivity made when Agfa Supreme negative was introduced to motion pictures. Until then, is it not logical

to expect that many of television's lighting problems could at least be minimized if television were to utilize the aid of some of the Directors of Photography who have made motion picture lighting the science it now is?

* * *

IT is with a deep sense of personal loss that we chronicle the passing, on May thirty-first, of Frank B. Good, A.S.C. He was a man who was in the finest sense of the word an artist and a gentleman: one in whose character, as well as ability, the camera profession could take great pride.

More significant than anything we might say is the tribute paid Frank Good during his lifetime by his fellow cinematographers who for the past sixteen years have kept him without interruption a member of the Board of Governors of the American Society of Cinematographers, and during most of that time, an officer of the organization. At the time of his death he had just been re-elected Secretary-Treasurer of the A. S. C. for the fifth consecutive year.

But it is not because of his distinguished career behind the camera or in the councils of his fellow cinematographers that Frank Good will be remembered—and missed. Rather, it is because he had the rare gift of winning the personal respect and friendship of all with whom he came in contact. Such a man leaves behind him a place that cannot be filled, and a host of friends who feel the better for having known him. We join them in extending to his wife and relatives the sincerest sympathy.



FROM "ONLY ANGELS HAVE WINGS"

Photograph by Elmer G. Dyer, A.S.C.

Flying High With Infra-Red

By ELMER G. DYER, A.S.C.

A few weeks ago Producer-Director Howard Hawks called me into his office at the Columbia Studio to discuss the photographing of the aerial sequences for a film he was about to make. After my signature had been duly inked on the dotted line, he handed me a script and told me, "Elmer, the air scenes you made for 'Hell's Angels' were great, and the ones you did for 'Night Flight' were just about tops. But we hope you'll surpass all of them for our picture 'Only Angels Have Wings'!"

That, as I read the script, promised

to be a man-sized assignment. The writers had handed us plenty of problems, not only in flying but in photography. From the flyer's viewpoint, there were some stunts that certainly couldn't be classed as easy, while the fact that the story dealt with airline flying over South America's Andes meant that we'd have to pick rugged, mountainous country for our aerial locations.

From the photographer's viewpoint, in addition to the tasks of filming the various flying stunts and making ordinary day-effect shots of planes in

the air, there were several night-effect sequences to be filmed. Some of these called for clear weather, others for ominous-looking clouds, and still others demanded storms. There were also both day- and night-effect background plates to be made in the air.

As if these problems weren't enough, the distributors were anxious for their film, and our schedule couldn't allow us much chance of waiting for ideal weather, or for making aerial retakes. We would have to work fast and accurately—and both the flyers and I were supposed to turn out something just a bit better than ever before!

Several Films Tested.

The first problem I tackled was that of making the flying night-effect scenes. If these scenes were to be made on the ground, few of us would have been perplexed; for during the last few years most of us have grown used to solving the night-effect problem by simply loading up a magazine of Agfa Infra-Red negative, slipping on a 23-A filter, and letting the film do the rest. But doing a night-effect from an airplane two or three miles up in the air yanks you up to a set of different atmospheric and lighting conditions, and technique that is good on the

ground may often prove the wrong thing for aerial filming.

So I began by making tests of practically every type of film available, testing not only Infra-Red, but a variety of background, high-speed and super-speed panchromatic types with such conventional filterings as the familiar 23-A-56 combination and the 72.

When these tests were completed, I had a pretty good idea I knew which gave the most convincing night effects, but to make sure I wasn't being carried away by purely photographic enthusiasm, I ran the tests for Producer-Director Hawks and his staff, and left the final decision to him. We all agreed that the tests shot on Agfa Infra-Red negative were by long odds the best and most convincing of the lot.

Night-Effects Two Miles Up.

With this decided, we went to work. Quite a few of our scenes were made flying over the high Sierras around Mt. Whitney, where we flew at altitudes of 11,000 feet or more. Some of the scenes were made with cameras in fixed mounts, rigidly attached to the plane; others had to be shot from mobile mounts so that I could 'follow' the action of other ships. At times we had as many as three or four cameras in operation at once, including a couple of Bell & Howells in fixed mounts, and my Akeley in a mobile mount.

While a medium light red filter gives the best night-effects when Agfa Infra-Red negative is used on the ground, I found that for aerial work—especially at the high altitudes at which we flew—a somewhat heavier filter is preferable. After a bit of ex-



Lockheed monoplane with two fixed-mount cameras under wings.



CLIMBING THROUGH THE NIGHT

Photographed by Elmer G. Dyer, A.S.C.

perimenting during my preliminary tests, I learned that the Agfa 81 filter is ideal for this. It is a rather deep red shade, midway between the familiar 29-F and the 70. For this high-altitude Infra-Red work, especially where there is usually such an enormous preponderance of blue and ultra-violet light to contend with, this 81 filter is ideal.

As I have said, our night-effect scenes had to cover a wide range of conditions, ranging from peaceful moonlit nights through increasing cloudiness and storms. The ships we used were metal: a great deal of the aerial action took place in one of the familiar old Ford trimotors. These silvery ships naturally photographed the same no matter what filtering we used—a great convenience for the cameraman!

Some of our shots showed the ship sailing along through clear black skies on a peaceful, cloudless night. Others showed it sailing along over huge, puffy white Cumulus clouds. In others, we chose lightings that rendered the cloud-banks black and stormy-looking. Some of the most effective scenes were those showing this silvery ship, under a black sky, droning along just above the rolling top of a huge cloud-bank; literally sailing over a sea of clouds.

Day Effects Too.

For making our daytime effects, we uncovered a new use for Infra-Red negative. By changing to a lighter filter, we were able to use this same film for day effects which were in many instances better than anything we could get with conventional panchromatic emulsions.

In most of these scenes I used a

G filter, which subdued the blue and cut out the ultra-violet of haze, yet still gave a lighter, more normal effect than any of the red filters would. For these day shots, I found Agfa Infra-Red a surprisingly versatile film. Except in rare instances, I used the film as I would any panchromatic type with a Weston speed of 24. I made the usual compensation of exposure for the G filter—using the same factor I would if I were using Superpan—and shot. The resulting negative gave me a fairly high correction, yet there was enough density in the sky area so that I could get just about any effect I wanted from a very slight correction to a heavily over-corrected day effect simply by manipulating the printing exposure.

All told, in filming these aerial scenes for "Only Angels Have Wings," we exposed over 30,000 feet of Agfa Infra-Red negative, under all sorts of conditions, both on the ground and in the air.

Sudden Temperature Changes.

One of the most trying conditions to which we subjected the film was sudden and extreme changes of temperature. Not so many years ago, such changes in temperature would have been absolute insurance of film ruined from static, and even more recently, since the coming of sound, I recall seeing a major-studio production made on a location where the film was subjected to such temperature-changes, which in several scenes showed static flashes. According to most film experts, the best way to avoid such troubles is to let your film change its temperature gradually.

But in our case, we couldn't do this. Often when we'd take off from

the Lone Pine airport we used as our base, the thermometer would be reading 70° or over. But within a matter of a few minutes, as we climbed to our working altitude of 12,000 feet or more, the thermometer would be down to 10 or 20 degrees below zero!

Yet in spite of these sudden changes of eighty or ninety degrees at a time, we didn't have a bit of trouble of any kind with Agfa Infra-Red negative.

But if the temperature-changes weren't troublesome to the film, they made up for it by being most unpleasant for those of us who had to do the flying! Piloting a ship at those altitudes is by no means a pleasant sport—but operating a free-mount camera up there comes under the heading of heartbreaking work. You climb into the ship swathed like a mummy in heavy wool-and-leather flying clothes, helmeted, begoggled and (if you are wise) looking like a man from Mars in a high-altitude face-mask. By the time the ship passes the two-mile mark, you are thankful for the warmth of the heavy flying clothes: but when you stand up in the blast from the propellor and try to operate a camera, you find that the bulk of the flying suit still remains to hamper your movements.

As if that wasn't enough, you discover that at such high altitudes you really need oxygen to breathe. The pilots, seated comfortably in the cockpits, can have oxygen hoses to help their breathing. But the poor cameraman, standing half exposed there in the slipstream from the propellor, doesn't dare to encumber his movements with an oxygen hose, so he simply does without it. Many times



*Elmer Dyer, ready for a high altitude flight.
Note face mask.*

I would film a scene or two, and then sink dizzily to my seat, groggy and almost unconscious, to gasp helplessly until the pilot took me down to more normal altitudes for a few lungfuls of denser air.

Landing in a Gale.

As I have said, for some of the scenes the script required storm conditions, so we found it our job to go aloft and hunt up some satisfactorily bad weather. That brought us to what was unquestionably the worst hazard of the assignment—and one of the most unpleasant moments of the many hours I have spent in the air. We had succeeded in our hunt for stormy-looking weather, and with our shot "in the box," headed back to the airport. We were flying in the steady old Ford Trimotor, ten of us, with Paul Mantz at the controls.

Coming in to land, Paul suddenly discovered that a really first-class windstorm had blown up since we took off.

As the big ship approached the ground, a sudden gust (and a potent one!) caught it under one wing, and swung the ship over sideways. I recall looking out of the cabin window, to see



NIGHT ABOVE THE CLOUDS

Photographed by Elmer G. Dyer, A.S.C.

the lower wingtip brushing within four or five feet of the ground—and wondering if my insurance was paid up!

Somehow Mantz—aided I am sure by the other nine of us unconsciously shoving over imaginary “joy-sticks” for all we were worth—got the ship righted. Just then another, and even stronger gust hit us and literally blew that heavy ship a hundred feet into the air like a feather! We heaved ten sighs of relief, even though we all knew that was only the first round, and we weren’t on the ground yet.

Coming around for another try at

getting the ship back to earth. Mantz was all set for another of those gusts—but this time no gust came, and we hit hard, with a jolt that must have been felt in China! Somehow, Paul managed to hold the “tin goose” on the ground until she stopped rolling, and on checking things over we found the only damage done was to our nerves. For a few minutes, though, I felt certain I had photographed my last scene. But I guess Providence had decided I mustn’t die before I’d shot a few more rolls of Infra-Red in the air!

Time and Temperature

vs

The Test System for

Negative Development

By IRVING MILLARD
*Night Superintendent,
Cinema Laboratories, Ltd.*

ALTHOUGH the laboratory processing of pictorial motion picture negative film has to a certain extent been standardized in recent years by the imposed limitations of composite sound and picture printing, there still exists a considerable difference of opinion as to the best methods to employ within those limitations to produce uniformity of contrast and density and at the same time to obtain in the developed negative the fullest measure of the artistic and dramatic effects created by the cinematographer. In general, there are in use today two basically different methods of negative development, each of which has its advantages and advocates and, inevitably, its disadvantages and its opponents.

These methods are the "time-and-temperature" method and the so-called "test system" of development.

The present article is not intended as a vehicle for partisan arguments for or against either of these systems,

but instead to serve the more useful purpose of providing a convenient summary of the facts regarding each, together with an impartial discussion of features which under practical conditions have been found to be assets and weaknesses of each.

Time-And-Temperature

Under the time-and-temperature system, negative is processed day by day at an established time of development, in solutions maintained at a constant and favorable temperature.

Solution control is generally exercised with the aid of sensitometric and visual solution film tests processed at regular intervals. Uniformity of solution strength is maintained by chemical manipulation.

Specifications established by experience as representing the most desirable standards for the proper development of normally-exposed negatives are rigidly observed. This system therefore offers the cameraman a theoretically

constant factor of development to which to peg his manipulations of lighting and exposure.

The Test System.

Differing radically from the time-and-temperature system of development, the test system is based upon the pre-examination of test strips which serve as a guide by which the developing time for the production negative may be altered in order to coordinate more closely the factors of negative exposure, density and contrast with the requirements of the positive printing scale.

In this method, solution temperature and strength are held constant, but the developing time altered to suit the needs of the individual negative. Solution maintenance is effected by substantially the same methods as used for this purpose under the time-and-temperature system.

This system therefore offers the cinematographer a certain measure of protection when he is working under unusual or difficult conditions, and theoretically allows a welcome flexibility.

The advocates of each of these systems naturally take pains to add to these sometimes theoretical arguments, facts of a more practical nature with which to uphold their contentions. Among those most justifiably advanced by exponents of the time-and-temperature system may be mentioned the following.

First, the possibility of reproducing without alteration or distortion an exact monochrome replica of the photographed scene.

Second, elimination of the need for making tests which are inevitably more or less costly to make, and

which can in many cases be inaccurate or misleading.

Third, reducing by one (the test reader) the variables interposed between the cameraman and the screen.

Fourth, the maintenance of an unvarying standard of negative processing to which the cameraman may adjust himself, and thereby be able to secure in a direct line the desired contrast and mood in his screened picture.

Theory vs Practice.

In theory, the writer has always held that the time-and-temperature method places the responsibility for negative uniformity both as to contrast and as to density in the hands of the cinematographer, where it rightfully belongs. Reducing the number of variables between his work and the screen is also a step in the right direction, since he alone possesses the complete knowledge of the effects, mood and visual tempo for which he is striving—a knowledge which in the existing structure of production is not readily available to the laboratory.

In practice, however, certain conditions tend to offset some of these theoretical advantages of the time-and-temperature system, as the adherents of the test method are at pains to point out. First among these is the virtual impossibility of maintaining a standard of absolutely consistent processing. While, in comparison to what was common only a relatively few years ago, we are justifiably proud of the consistency of modern methods and machines, it must be admitted that this consistency is relative, rather than absolute, and that in methods based on consistent solution strength, temperature and machine speed, sufficient



SOAP BUBBLES

Photographed by Bob Levy

errors, minor in themselves perhaps, but cumulatively of noticeable magnitude, can occur.

It has also frequently been pointed out that this system of development lacks the flexibility which would en-

able the laboratory to aid the cameraman by making compensation for the inevitable small day-to-day variations in his lighting and exposure. In addition, such a system utterly lacks the flexibility to help him by under- or

over-developing negative photographed under unusual and abnormal conditions.

Tests—Pro and Con.

Laboratories employing the test system point especially to the following facts as advantages obtainable by that system.

First, the proper making and use of tests affords very considerable protection insofar as the printing scale is concerned to the cinematographer forced to shoot under abnormal or subnormal conditions.

Second, it affords similar protection to cinematographers who by habit light in either a dangerously low or a dangerously high key.

Third, it permits absorption of the effects of the inevitable slight solution differences which may exist from day to day. The same factor similarly aids in smoothing out the individual cameraman's day-to-day variations in lighting and exposure previously referred to.

These advantages are equally beneficial to the cinematographer working on a major studio's top-budget productions and to his fellow cameramen working under the restrictions of short schedules and budgets. If anything, they can be more valuable to the latter, as such conditions often necessitate long and fatiguing hours and occasional disregard of ideal photographic conditions. It is the function of any laboratory when faced with such conditions to offer all assistance possible, and it has repeatedly been proven that in such circumstances forced development of underexposed negative, or retarded development of overexposures to a point permitting

adequate printing densities, even if at some loss of perfect photographic quality, has been beneficial to the screen appearance of the picture as a whole.

On the other hand, it must be pointed out that the tests involved require valuable time and effort if they are made properly, and even so can under modern conditions prove misleading. Consider, for instance, a light-effect shot in which a strong beam of light is to simulate sunshine coming through venetian blinds which are to be closed during part of the scene, but are opened later in the shot. A test made for the initial lighting, with the blinds closed, will give no indication of the exposure-values when the blinds are open, and vice-versa, so that it is unpleasantly easy to develop the scene incorrectly on the basis of such a test. The same applies with equal force and greater frequency to the modern moving-camera shots, in which the camera may dolly through a very considerable range of lightings and exposures within a single shot.

The test system, too, if carried out on a proper scale, demands an intimate cooperation between the cameraman and the laboratory if it is to function to advantage. Such cooperation, under modern productions conditions, is difficult, if not impossible to obtain.

On the other hand, in most laboratories today the need of frequent tests can be, and is minimized by the fact that after the initial tests have been made the laboratory can establish a normal average developing time for each cinematographer's negative. Thereafter, in normal production, tests need be made only as a safe-

guard or check comparable in a way to the laboratory's own visual and sensitometric tests, and of course as a means of guiding the laboratory when any unusual conditions have been faced on the set.

Practical Conclusions.

In conclusion, it may be remarked that there exist certain practical aids which may be utilized by cinematographers working under either of these methods of negative processing, and which will help in overcoming the weaknesses of the processing system involved.

An outstanding weakness of the time-and-temperature system is the fact that it subjects all negative, regardless of lighting or exposure, to a fixed standard of development. The cinematographer operating under this system of negative processing can therefore protect himself to a degree by selecting a negative emulsion having the maximum exposure-latitude characteristic. In this way he can expect the film itself to aid in compensating for any unevenness of exposure levels.

In this connection, too, it must be pointed out that the intelligent use of a modern photoelectric exposure meter can be of tremendous aid to the cameraman in maintaining on his part a consistency of lighting and exposure values which will match the standardized negative developing procedure. It is significant that the two organizations making the most extensive use

of photoelectric light-measuring devices both use the time-and-temperature method of negative processing.

Cinematographers whose negative is processed in plants using the test system can anticipate that their negative may, in the interest of maintaining consistent printing densities, at times be over or under developed to some extent. They will obviously find it an advantage to select a negative emulsion which offers a wide latitude in development.

Since consistency in exposures will obviously minimize not only the number of tests required, but also the laboratory's manipulations of the developing time, these cinematographers, too, will find the proper use of photoelectric exposure meters beneficial. In this connection, however, it is well to echo the statement frequently made by other writers, that these meters must be used with intelligence, or not at all.

In general, it can be seen that as practiced today, both the time-and-temperature and the test system of development offer worthy advantages, and that if the cinematographer will make intelligent use of the aid offered by modern materials and methods, he can be sure of excellent results regardless of which system is used in the processing of his negative. And it may be reasonably concluded that the gap between these different and much-discussed methods is in practice slowly but surely lessening.



WILSHIRE BOULEVARD

Photographed by Franklin S. Allen

Minicam Aerial Stills Tell Story of "American Weekly" Circulation

By FRANKLIN S. ALLEN.

*Los Angeles Manager
The American Weekly*

AN unexpected crowd of 100 people in the street will tangle traffic and make a front-page story for newspapers.

4,000 people in the Olympic Auditorium is an impressive fight crowd.

100,000 people at a football game is about as many people as the human mind can visualize.

And when crowds get this big, it takes an expert to tell within 25,000

or 30,000 of the correct number. When you go over 100,000 individuals, very few people can differentiate in their own minds between 1,000,000 or 2,000,000, or 5,000,000 or 7,000,000.

Therefore, when you have a publication with a circulation of nearly 7,000,000, or approximately one fourth of all the homes in America, it becomes a very serious problem to get people who spend their money for ad-



LOS ANGELES

Photographed by Franklin S. Allen

vertising to comprehend the bigness of this audience. As a matter of fact, a small publication often gets two, three or four times as much per thousand circulation because its page rate seems low in proportion, and because the space buyer does not visualize the difference between 700,000 and 7,000,000 or even between 3,000,000 and 7,000,000.

That is the problem faced by those of us who are concerned with the business side of "The American Weekly." It is our task to bring home to our advertisers and prospective advertisers not only the fact that "The American Weekly" will take their message into nearly 7,000,000 homes, but also what that sort of coverage can do for the sale of their product.

Putting It In Pictures.

If you have ever tried to convey the practical meaning of such huge figures

to other people, you will realize the truth of that over-worked old Chinese proverb. "One seeing is worth ten thousand tellings." But in our case, the problem is how to find ways of portraying this coverage in graphic form. We can tell an advertiser, for instance, that in Los Angeles, "The American Weekly" reaches three out of four homes on the entire Pacific coast. That it reaches two-thirds of all homes in those counties that account for 95 per cent of all the retail sales. We can quote surveys by Daniel Starch which indicate that every copy of "The American Weekly" averages two adult readers, in addition to the children who read it. But we are still only talking about figures so enormous as to be intangible.

Therefore we try to tell our story of circulation in pictures. To be specific, in pictures that take our



*Looking Down
On Westwood*

*Photographed by
Franklin S. Allen*

coverage out of the abstract and put it in terms that any successful merchandiser can understand.

To assist me in this effort, I recently engaged the Goodyear blimp "Volunteer," slung my Contax around my neck, and made a study from the air, photographing, for example, a filling station or a grocery store in which the products of an advertiser or a prospective advertiser might be sold, and the homes that surround it.

When the negatives were developed, I had enlargements made—big ones—and placed check marks on those homes that actually get "The American Weekly."

Then I show the prints to the advertising manager of the firm in question. When he sees this picture of an actual point of sale of his own product, surrounded by homes that actually read our publication—and these check marks indicate that two out of three or three out of four actually do receive it—he has a graphic visualization of our coverage, expressed in tangible terms far more easily comprehended than any talk of millions.

Using Supreme In The Air.

Agfa Supreme negative plays a big part in this. Ever since the intro-

duction of this film, I have used it and found it by far the most useful, all-around film on the market. In the air it is particularly spectacular.

Making stills in the air, regardless of whether you are flying in a blimp or in an airplane, you have several definite photographic problems to conquer. First of all, you must use a fairly high shutter speed, to overcome the vibration of the engine. In my experience, that means a speed of $1/250$ th of a second or faster.

Next, in order to assure the maximum of definition, one always prefers to stop the lens down as far as possible.

At the same time, for penetrating the ever-present aerial haze, it is necessary to use a filter.

In addition, using these aerial minicam photos as I do, where more than ordinarily big enlargements are necessary, a film with real fine-grain quality is imperative.

All of this points to the need for a fast, highly panchromatic film which in spite of its speed is of the fine-grain type. And it gives its own answer, for these requirements give an excellent picture of Agfa Supreme negative.

In addition, there is the question of brilliance to be considered. Too many non-professional air shots tend toward an unpleasant flatness in both lighting and contrast. For really satisfactory results you want to use a film that will give you a normal snap and contrast, without forcing you to resort to using either an over-correcting filter or printing on an extremely 'hard' paper.

My experience has been that Agfa Supreme fulfills all of these requirements to perfection. With a "G" filter, shooting at $1/250$ th of a second at an opening of $f:5.6$, I am able to stop the vibration of any type of aircraft, and get a picture with definition, brilliance and sparkle that nothing else seems to give. As for grain size, since I have been using Supreme I have had very little occasion to give a thought to grain. Most of my aerial negatives have been enlarged to 11×14 , and some to even larger sizes. Yet even in such enlargements, the grain remains so inconspicuous that when, as recently, I exhibited a 20×30 inch enlargement from an aerial minicam negative to a photographic friend, and boasted proudly of the fine-grain quality, I got the reply, "What grain?"

Blimps and Planes.

So much depends on individual developing methods that most statements as to film speeds must necessarily be generalities. The official factors quoted for Supreme's speed by both Weston and Agfa—Weston 64—seems to me to be a most conservative average. In my own use of the film I always take my meter readings using a speed factor of 100, incidentally using the same figure for both natural and artificial light, and I still have to watch myself to keep from overexposing and overdeveloping my negatives.

Working under unfavorable conditions I have found Supreme to have not only unusual speed, but unusual latitude in development. It is really uncanny to see the way the film gives quality results even when for any reason you have to force the development to the extreme.



*Long Beach
Marine Stadium*

*Photographed by
Franklin S. Allen*

Making aerial pictures, either for pleasure or for business, a blimp like the Goodyear blimp I used is without doubt the ideal type of aircraft. Only in a blimp can you have the motors throttled down, or switched off entirely, allowing the ship to hang motionless in the air over your subject, while you open a window, lean out and snap your picture at leisure.

On the other hand, if you are going somewhere on one of the commercial airlines, don't let the fact that you will be flying in a 200-mile-an-hour cabin ship give you the idea you can't get good aerial pictures with your minicam. You can! In the course of my work I frequently fly up and down the coast, or to New York, and on these trips I've bagged many excellent pictures with my Contax.

In general, any shutter-speed over $1/250$ th of a second will be fast enough to stop the vibration from the engines; but don't make the mistake of bracing your camera or your elbows on any part of the plane. That intensifies the vibration, transmitting it more strongly to the camera. Instead, brace your elbows against your body, and use your whole body as a shock-absorber for the camera.

Always make a point of being first at the gate, and select the rear seat

on the *opposite* side from the sun, figuring ahead where the sun will be *after* the plane takes off.

The windows in modern airliners, if they are clean, will give the camerist no trouble. But be sure they are clean! When I take an airline trip, I make it a point before we take off to tip the porter to wash my window for me. If, as sometimes

happens on even the best airlines, the engine on your side is throwing oil, another quarter spent the same way at each stopping point will do your pictures a world of good.

For the rest, follow the dictates of your exposure meter, directed at the ground, use a "G" filter and Agfa Supreme—and you'll have some aerial shots of which anyone might be proud!

Our Illustrations

When a newspaperman turns to photography as a hobby, almost anything can happen. The article on Page 21 tells what happened when one news h a w k — *Lyle Abbott*, of the Los Angeles Evening Herald-Express — combined the hobbies of astronomy and photography. Our frontispiece, "Pathway to the Stars," shows another facet of *Abbott's* photographic enthusiasm. The picture, he tells us, was made on Agfa Superpan Press, through a K-3 filter, exposed 1/200th second at *f*:32.

The camerawork of *Franklin S. Allen* (another newspaperman), whose aerial pictures of Southern California are seen on pages 16, 17, 18 and 19, is too familiar to our readers to require any introduction. Besides, *Allen*, in his article, tells how and why he made those pictures much better than we could.

Yes, the *Bob Levy* who made the delightful picture of the boy blowing soap-bubbles, which we reproduce on page 13, is the second generation of the cafe *Levys* now serving the third generation of *Levy, Senior's* customers. After seeing what *Bob* can do with a Leica and Agfa Supreme, we'd say

he is almost as good at picture-making as his chef is at making Bouillabaisse —and that, gentlemen, is praise!

When you've said *Elmer Dyer*, you've said aerial cinematography. The pictures which illustrate his article, which begins on page 5, may help the three or four of our readers who don't know *Elmer* to understand what we mean by that.

The picture of the Griffith Observatory on page 21 is no glass shot, so *Len Galezio, A.S.C.*, assures us. It is a bona fide moonlight scene photographed on Agfa Ultra Speed Pan.

Morgan Salon.

Three years ago, *Gilbert* and *Nina Morgan*, of the *Morgan Camera Shop*, held the first Morgan Camera Shop Salon. Today the third edition of this salon, grown to international proportions, is on display throughout the month of June. Its worth seeing.

While Southern California camerists predominate, there are entries from every part of the U. S., from British Columbia, and even from Alaska. We are rather proud to note that 50 of the 77 exhibitors used Agfa films for one or more of their entries.



GRIFFITH OBSERVATORY

Photographed by Len Galezio, A.S.C.

Infra-Red Pictures Los Angeles Through Observatory Telescope

By WILLIAM STULL, A.S.C.

PERCHED high on the hills above Hollywood stands an impressive, triple-domed building—the Griffith Observatory. Most inhabitants of the film city, whether they have ever visited the observatory or not, point to it with pride as they tell visitors that its huge central dome contains one of the three or four planetariums in America.

But few of them realize that the two smaller domes which flank the massive central one which houses the planetarium's dome-shaped screen are there for practical service as well as for architectural balance. One of them houses a coelostat; the other, a

massive twelve-inch Zeiss telescope. Both are dedicated to the task of bringing to Hollywood's citizens glimpses of the actual heavens, to supplement the manufactured heavens of the planetarium.

However, if this state of ignorance exists, it is not the fault of Lyle Abbott. Officially, Abbott is Assistant News Editor of the Los Angeles Evening Herald-Express. Unofficially, he is an amateur astronomer of no mean attainments, and for a long time was intimately connected with the observatory and its work. Combining these two varied interests, he has kept readers of the Herald-Express supplied



Los Angeles Civic Center as seen through Griffith Observatory

with what is perhaps the most authoritative coverage of astronomical happenings ever seen in a daily newspaper.

Photography plays an important part in this. If an eclipse of sun or moon is visible in Southern California, or if a wandering comet pays us a call, photographs of the event are featured in the next edition of the *Herald-Express*. Even when no such heavenly sideshows are in progress, Abbott kept this, the city's biggest news camera, in the public eye by training it on terrestrial objects—giving the commonplace a new angle by photographing it through the telescope.

Accidental Beginning.

This idea, Abbott says, began more or less accidentally some four or five years ago, shortly after the telescope had been installed. One chilly Sunday morning, realizing there was to be visible a partial eclipse of the sun shortly after sunrise, he and the writer essayed to give the new telescope its baptism by photographing the eclipse through it. Armed with a Contax and a 4x5 newspaper Graphic, we climbed the hill before dawn, and set about

improvising some way to get the pictures.

The task was rendered more difficult by the fact that unlike the telescopes used in observatories less directly concerned with the general public, the Griffith instrument was designed only for visual observation, and provided no means of fitting cameras or plateholders to the telescope. Ultimately it was found that by removing the eyepiece and clamping in its place a sheet of white cardboard upon which the image focused, we could obtain an image of the sun's disc which could be re-photographed with the press camera.

Then—just as the eclipse commenced—a bank of heavy clouds drifted up and obscured the sun!

This failure, however, only whetted Abbott's ambition to use the telescope for photographic purposes. In addition, with the telescope trained low on the horizon, to focus the rising sun, unexpectedly interesting views of such familiar landmarks as the Los Angeles City Hall and Forest Lawn's "Tower of Legends" were revealed.

Abbott applied himself to the design and construction of a photographic



Telescope, 10 miles distant Photographed by Lyle Abbott

attachment for the big tube. Aided by Life Magazine's Paul Dorsey, a special fitting was built to replace the telescope's usual ocular or eyepiece. At one end a massive ring clamped to the telescope tube. At the other was a fitting to hold a standard 4x5 Graphic plateholder with its dark slide.

Tested out with conventional Agfa Superpan, the device worked to perfection. But there still remained the problem of piercing the veil of aerial haze which, especially over a big city, hides the distance. No practical combination of conventional film and filtering would do it.

At this point Abbott secured a supply of an experimental cut-film coating of Agfa Infra-Red negative. This brought success at last, and one day this winter, readers of the Herald-Express were treated to a panorama of Los Angeles' Civic Center area, photographed on Agfa Infra-Red negative through the city's most powerful telephoto lens.

"The sensitivity of Agfa Infra-Red," says Abbott, "is ideal for this purpose. The haze which gives us so much trouble when we try to make these shots with conventional films is

composed very largely of ultra-violet and violet light, which is easily filtered out by use of a 29-F filter. In addition, the infra-red rays to which the film is most sensitive penetrate from a distance much more strongly than any visible light can.

"Another asset is the relatively high speed of Agfa's Infra-Red emulsion, especially when compared to the older infra-red sensitive plates and films which, slow in themselves, required the added use of a filter which was virtually opaque visually, and naturally increased the exposure enormously. In telescopic work, especially in anything such as this, where the telescope must be trained low and used through miles of atmosphere,



Lyle Abbott

lengthy exposures are a liability, because of the distortion so often caused by reflected heat-waves.

"I think we were using the most powerful telephoto lens ever used in Los Angeles. The Griffith Observatory telescope is of the refracting (lens) type, with a focal length of 16 feet 8 inches. The lens works at a fixed maximum aperture of 12 inches, giving us an effective working speed of $f:16$. With this relatively small aperture, any film which will cut exposures to the minimum is a big help.

"By way of comparisons, I might mention that the huge 200-inch mirror telescope now being built at Cal-Tech for use in the Palomar Observatory will work at a speed of $f:3.3$ while the Schmidt scouting telescope already in use there works at $f:2$.

"Our first tests were made on Agfa Superpan, using a K-3 filter, which happened to be the only one available at the time large enough for our purpose. With this combination, photographing the Los Angeles City Hall, over 8 miles from the telescope, our exposure was $1/10$ second at the telescope's one aperture, $f:16$. Using Agfa Infra-Red negative and a 29-F filter, our exposure was 2 seconds, of course at the same aperture. I have since gained access to a private telescope of equal power, but of the reflecting or mirror type. This works at an effective aperture of $f:3$, which should cut our exposures down to $1/2$ second. With it I am planning to make further telephoto panoramas of the city, including, if the weather favors me, a panorama of the Fleet at anchor in San Pedro, more than 20 miles away.

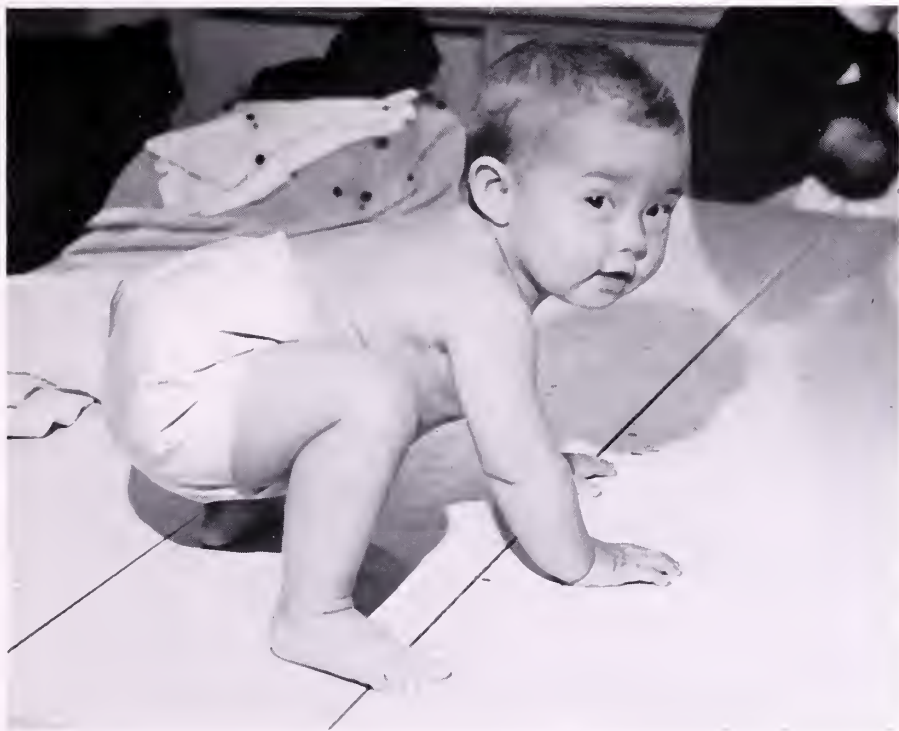
"What is my purpose in all this? Well, it is not solely that of exercis-

ing my astronomical hobby, nor even of getting strikingly unusual pictures for the Herald-Express. What I am hoping to do is to begin to arouse a telephotographic consciousness in the minds of Southern California's hundreds of amateur astronomers. There is a really incredible number of these private backyard observatories in this territory. Some of them house commercial telescopes; far more house instruments home-made—even to lenses and mirrors—by these enthusiastic amateur astronomers.

"But very few of these amateurs have discovered the possibility of harnessing photography to their hobby. And once the thrill of looking at the heavens through a telescope you have made yourself has worn off, you are in a mood to welcome something new.

"As it is, while much good, constructive visual observation is being done by these amateurs, it is by no means as systematic and scientifically profitable as it could be. Quite a few worthwhile astronomical discoveries have been made by amateur astronomers; but there is always a chance for error in something new observed only visually.

"If these amateurs would fit photographic attachments to their telescopes, they would not merely have proof of their observations. They would learn that the camera can reveal stars too faint to be observed visually. And when they made new discoveries, they would have the evidence in tangible form which could be analyzed by professional astronomers, and would in all probability add more importantly to the sum total of our astronomical knowledge."



Photographed by Earl Theisen

A Good Start

In cinematography, getting off to a good start makes the job easier and success more certain.

The surest way to get off to a good start on any cinematographic assignment—routine or extraordinary—is to have your cameras loaded with *Agfa Supreme* negative film.

Agfa Supreme is the pace-setter among modern, high-speed production

films—the first of its type, and still the standard by which modern film performance is judged. If for *your* next cinematographic start you want a film which ideally combines high speed, fine grain, fully panchromatic quality and gradation, *Agfa Supreme* will give you the good start you want. Made by Agfa-Ansco Corporation in Binghamton, New York.

Distributed by

AGFA RAW FILM CORPORATION

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S U P R E M E





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Motion Picture
TOPICS

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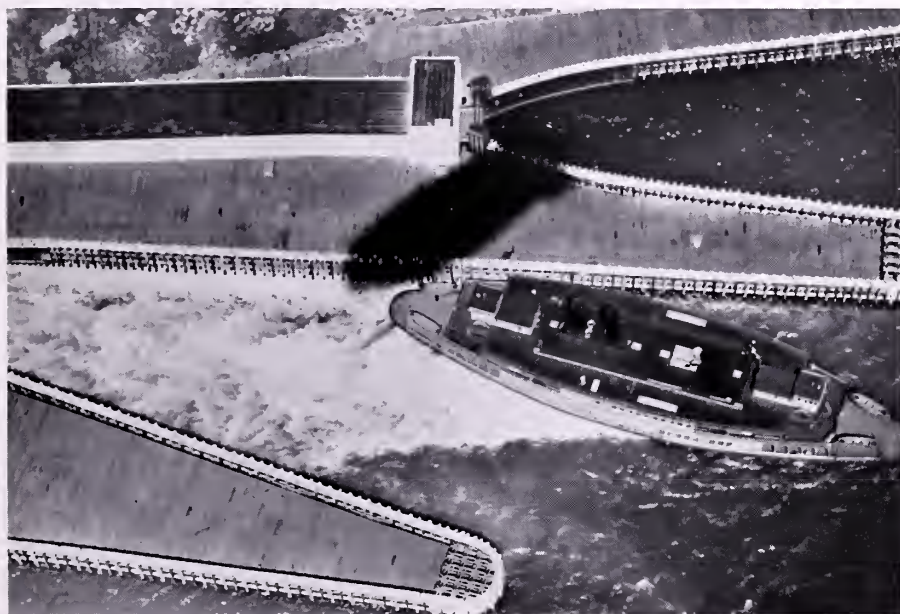
MOTION PICTURE TOPICS

WILLIAM STULL - A. S. C.

EDITOR

Contents

TIMELY TOPICS	2
MODERN FILMS AND SPECIAL-EFFECTS CINEMATOGRAPHY	7
<i>By FRED W. JACKMAN, A.S.C.</i>	
IT'S A PHOTO-CHART FINISH! <i>By WILLIAM STULL, A.S.C.</i>	14
USING MODERN FILMS TO SIMPLIFY MODERN PROBLEMS	22
<i>By MARCEL PICARD, A.S.C.</i>	
SHOOTING STILLS FOR AN AIRLINE <i>By LEON MILLER</i>	27
OUR ILLUSTRATIONS	31
OF INTEREST TO ALL	32
LAKE TAHOE . . . <i>Photographed by TRUMAN D. VENCILL</i>	<i>Frontispiece</i>



FERRY SLIP

Photographed by Franklin S. Allen

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Timely Topics

THIS year marks the fiftieth birthday of the motion picture industry—the fiftieth anniversary of the presentation of the first moving picture. As the industry prepares to celebrate its golden jubilee, those of us who are engaged in the phototechnical phases of that industry may well pause to consider for a moment how greatly the industry and all of us who work therein are indebted to film.

Today, film is a commonplace. It is the stuff we make our pictures on, and upon which we ship our shows to the world's theatres. We use it: we know the characteristics of each type and have our individual favorites: but beyond that, we take film for granted as a natural and inevitable part of making moving pictures.

It was not always thus. Fifty-odd years ago, when Thomas Edison, his assistant W. K. L. Dickson, and others were trying to turn man's age-old dream of living pictures into fact, film of any type, size, shape or quality was as earnestly sought after—and apparently as impossibly distant—as is atomic power today. Edison—and others before him—knew what film should do: what it should be like; how it should be used in making moving pictures. But they did not have it, and they did not know how to make or get it. They knew only that without it, motion pictures were an impossibility.

Nearly four thousand years ago the ancient Egyptians knew that a series of pictures of a moving object, each representing a slightly later phase of

movement would, if viewed rapidly and successively, blend together to give an illusion of motion.

Once photography had been invented and refined to the point where instantaneous exposures were possible, there remained only the mechanical problem of finding a way to bring into place, expose, remove a dozen or more light-sensitive surfaces per second in taking, and comparable operations with developed pictures in viewing, to make moving pictures possible.

The sole stumbling-block was the lack of suitable mechanical support for the pictures. Glass plates, which were universally used for photography at that time, would not do, for glass plates are bulky, heavy and breakable. Paper would not do, as it is not transparent.

Thus in 1837 all practical research toward motion pictures stood stalemated, waiting for somebody to invent an emulsion support which was light, flexible, durable and transparent.

That same year, the Rev. Hannibal Goodwin announced and patented his invention of celluloid-based photographic film, and the firm which is now the Agfa-Ansco Corporation placed it on the market. Here at last was a negative material which was light, flexible, durable and transparent. Motion pictures were at last thoroughly practical!

To turn them into a practical fact was but the relatively simple matter of designing the necessary mechanical equipment to perform the operations of moving and exposing the film. We do not mean by this statement to de-

tract from the achievements and ability of such brilliant pioneers as Edison, Lumiere, Dickson, Friese-Greene and the rest, but only to point out the fact that until they had film—the basic material for making their pictures—they could not progress; as soon as film was available, they could (and did) bring their ideas quickly, and relatively easily, to brilliant fruition.

Today—half a century later—we take film for granted. When technicians discuss film products, they concern themselves only with the emulsion coated on the celluloid. When most of the others in the industry think of film, they think only of the pictures captured on the emulsion. None of us gives a thought to the unobtrusive strip of celluloid which carries both emulsion and picture.

Yet in simple fact, our entire industry is founded on a strip of celluloid: a little thing, virtually unnoticed today, yet as vital in 1939 as it was in 1889, for in more than half a century of scientific research, the world has failed to find a satisfactory substitute for—film.

* * *

WE hear a great deal today about the vast, and largely untapped potentialities of the Latin-American market, particularly South America, and of the importance of getting a better understanding of the entertainment tastes of our southern neighbors so that we can make pictures that will please them.

During this last month, Hollywood has had a unique opportunity to gain truly first-hand information on this point. Donald Gledhill, the energetic Secretary of the Southern California Film Society, took the trouble of

bringing to Hollywood tangible proof of what filmgoers in one of South America's greatest nations—the Argentine Republic—like. On July twenty-first, twenty-second and twenty-third he gave Hollywood the privilege of viewing two of the latest and most successful Argentine-made features, "*Alas de mi Patria*" and "*Puerta Cerrada*," both produced by Argentina Sono-Film, of Buenos Aires.

To many of us here whose knowledge of Spanish America is bounded by the southern borders of Tiajuana and Agua Caliente, or perhaps Ensenada, these films should be eye-openers. They reveal a cultured people, far removed indeed from the serape-wrapped peon of fiction, and a sober, purposeful outlook even farther removed from the fandangoes and rhumbas of our so-called "latinized" music-films. Above all, they showed human beings who live, love and meet problems quite as any North American or European might.

From the more technical viewpoint, either of these films would be a credit to any nation with a film industry less completely established than Hollywood's. To a certain extent they inevitably show that their producer did not have Hollywood's lavish technical and other resources to draw upon, but in the whole, they compare most favorably with the standards set in most of Hollywood's independent productions and in some respects even with many major-studio program films. In each of the productions, the acting talent shown in the stellar roles would be an asset to any of our major productions.

Photographically, both productions are praiseworthy. The many excellent

process-shots seen in "*Alas de mi Patria*" are a pleasant surprise to those of us who had thought this technique restricted to the studios of Hollywood and Europe. In "*Puerta Cerrada*" the photography of John Alton, A.S.C.—a Hollywood cinematographer—justified the Argentine reviews which had given the cinematographer equal recognition with the star. In this connection, we hope one day to see the work of another Hollywood cinematographer, Tony Kornman, who recently travelled south to aid Argentina's film industry. The work of both of these Americans should give a forceful answer to the people in Hollywood who think that photographic ability is miraculously restricted exclusively to the relatively few names found on major-studio contract rosters!

We don't know how many of the people who have been preaching the gospel of Hollywood films for South American audiences were alert enough to see these two pictures—much less how many of the people who should have seen them did so. But if only one of these executives did so he will agree with us that Don Gledhill deserves an Academy "Oscar" for bringing these films to Hollywood to show Hollywood's executives and creators what Spanish America wants in its movies!

* * *

WE'VE no patience with the spineless "critic" in whose reviews everything is perpetually good. But at the other extreme, we grow equally annoyed with reviewers who essay to pass expert judgment on something they know little or nothing about.

Photography is an excellent exam-

ple of this point. It is a highly technical art, and subject to many conditions which, like bad sets, costumes or make-up, limited schedules, indifferent laboratory work and the like, which are not always under the control of the Director of Photography. In addition, we have all of us seen instances in which a working-print was previewed, and gave an impression of poor photography which would subsequently be disproved by viewing a properly balanced release-print.

The technician, viewing a preview under such circumstances, can generally put the finger on these factors, and adjust his estimate of the cinematographer's work accordingly. The layman as a rule cannot.

In the very nature of things, few if any of our daily and trade-paper critics can be technicians. A few of them have the benefit of sufficient personal experience within the industry, or of serious practice of amateur still or movie photography, to give them at least a sympathetically semi-technical viewpoint on things photographic. But the majority, in so far as photography is concerned, are laymen pure and simple.

Since this is the case, it doesn't strike us as being quite fair for the lay critic to irrevocably damn the photography of a picture. This is particularly true because the cinematographers most likely to encounter handicaps beyond their control are the two groups most urgently in need of critical tolerance. On the one hand, there is the very young man, just struggling up from the ranks, trying, perhaps for the first time, to make good as a Director of Photography. On the other,

there is the older man demoted, whether for good cause or mere prejudice against his gray hairs, from "A" pictures to programmers. In either case, the cinematographer is inevitably working against the myriad handicaps of short time and money, indifferent sets, inadequate facilities and, too often, careless laboratory work. A printed condemnation works overtime against such a man.

The technically trained reviewer can recognize these things, and take them into account in forming his opinion of the cameraman's work. If, after all the variables are summed up, he feels that the photography has some redeeming features, he can at least dismiss it softly as "adequate." If not, he can still realize that many conditions unknown to him, and sometimes best left unmentioned—as for example a resolutely uncooperative director—may be unseen factors; and he can remain charitably silent on the photographic score.

The untrained critic can do well to follow this latter course. Like any layman, he can tell that he likes a piece of photography without necessarily knowing why; and that same lack of specific knowledge should impel him to speak softly when he does not like photography, for he cannot, as a rule, say why he does not like it, much less ~~be certain of it~~ ^{be certain of it} that way. Under modern releases, nor could they be photographed so efficiently. But they could still be made adequately on yesterday's ortho film.

On the other hand, special-process cinematography as we know it—most notably the projected background process—literally owes its existence to the competition-bred urge to increase film speeds. It was not possible on

to condemnation—who doesn't? They are big enough to admit their shortcomings, and to accept merited reproof from anyone who can criticise understandingly. But they do feel justly entitled to receive the benefit of the doubt from critics who do not have the peculiar technical training that would enable them to analyze what is seen on the screen. All they ask is that the reviewer be big enough himself to refrain from condemning that which he does not understand.

* * *

So capable are our modern special-process cinematographers that we seldom have an opportunity to see what would happen if we were suddenly robbed of their services. ~~increased as photography advances~~ in direct proportion to successive increases in film sensitivity. It has attained its present broad scope largely as a result of the introduction of today's ultra-fast negative materials.

During the period when cinematography and what we then called "trick camerawork" were growing up, many of us toyed with the idea of rephotographing projected backgrounds, always being brought up sharply by two facts—as hard as any brick wall. First, there was no method other than the use of cumbersome mechanical linkages—belting and long shafts—by which we could synchronize the camera and projector. Second, and most important, the negative materials then available were far too slow to permit rephotographing any sort of a projected image. So while many of us thought wishfully of the idea, none of us could put it into practice.

So far as I have been able to learn, it was my privilege to be the first to make practical use of the basic prin-

ciples of what we now know as the projected background or transparency process. That first experiment, so many years ago, now seems as crude as Benjamin Franklin's kite: but it may serve to show how much process camerawork is dependent upon film speeds.

"Process Shots" in 1925

When we were making "The Lost World" for First National, back in 1925, we decided that one of our miniature shots of the dinosaurs would be more convincing if we could show a background of moving clouds.

We were working in stop-motion: animating painted clouds would be an almost impossible task, doubly so when added to the difficulties of animating our miniature monsters, and combining the miniatures with full-scale shots of the living principals.

So we tried projected clouds.

Our set represented a tropical canyon. For the sky in the extreme background I obtained a sheet of the largest size of positive cut-film then available. Behind this I placed a Kleigl theatrical spotlight, fitted with one of the then-popular effect-devices which by means of a revolving slide cast a pattern of moving clouds.

Working at normal camera-speeds, this would have been enough. But in stop-motion, it became necessary to devise some method of synchronizing the camera and the moving cloud-effect slide, so that the clouds would animate smoothly.

Of course, in those days normal speed meant 16 frames per second. So we checked the action of the effect spotlight until we found just how much the slide and its projected image

should move in 1/16th of a second to give a normal effect.

We were already driving our stop-motion camera by motor with an electric clutch-control mechanism which exposed one frame each time the release button was pressed.

It was not particularly difficult to design a similar mechanism to operate the rotating cloud-effect slide on the spotlight. This was set so that when the controlling button was pressed, the slide was moved just enough to give the correct one-frame animation.

Interconnecting these controls so that only one button need be pressed finished the job. When this master control button was pressed, the clutch on the camera let the motor expose one frame of film. Then—and not until then—the cloud-slide was advanced the proper distance.

Thus we had, in a crude way, the first electrical synchronization of the camera and background projection. It was crude, but it worked.

Impossible With Slow Film

The point that must be understood is this: that this crude "projection-shot" was possible at that time only because we were able to work in stop-motion, with its necessarily more ample exposure. It would have been impossible in normal-speed camerawork, simply because with the film then available we could not have gotten an adequate exposure, even in this case when we concentrated the beam of a theatre spotlight on a screen less than 30x40 inches in size!

Only a few years later, sound came, and brought with it the now familiar methods of electrically synchronizing any number of cameras and recorders.

Naturally, the same interlock that kept a camera and a recorder, or a recorder and a projector in step could also be used to synchronize a camera and a background projector.

But still the projection process was impossible, simply because the film then available did not permit us to get an exposure in any reasonably-sized projected image.

Only when the first super-panchromatic emulsions were introduced did it become possible to make composite shots in which the background behind living actors consisted of a rephotographed, projected motion picture. That I and the staff I then had at the Warner Brothers'-First National Studios made the first use of this process, and obtained patents on the basic features of the process, is beside the point. If we had not done so, someone else would have, for many cinematographers were thinking of the idea, and the mechanical means and the sensitive materials necessary to make it possible were at last at hand.

Successive Improvements

Since then, the physical scope and utility of the process have steadily increased. It is true that great strides have been made in methods and in the efficiency of equipment, especially lamphouses and arc carbons. But any impartial analysis will show that each really notable advance has followed close on the heels of the announcement by one film manufacturer or another of a faster emulsion.

Second in importance only to the advent of those earliest superpan-type films which made the process possible is the advent, nearly two years ago, of the first of today's modern, super-fast films—Agfa Supreme, and the

similar types which have since followed it. Let's consider what these films mean to process photography.

The production utility of the process is measured by two factors. First, the physical scale upon which it can be employed. Second, the convincing effect possible in the blending of live and projected action in the composite picture.

It is obvious that if technical considerations limit us to screens five or six feet wide, we will be restricted to rather close angles in the composite shot, or to small-scale backgrounds such as could be seen through a rather small door or window. If the script calls for long-shots or angles which would overshoot our small background screen, it will be necessary to take the company actually on location, and to work by conventional methods. In such an instance, it would be almost better to have no process-shots, rather than to have them restricted to only the more intimate angles. Little, if any time, money or effort would be saved.

Depth of Focus

Secondly, assuming that process screens of larger dimensions can be illuminated to a technically practical exposure-level, we will still find ourselves badly hampered if screen illumination forces us to make our scene at the maximum aperture of the composite camera's lens, for the focal depth will not be sufficient to give us a normal relationship between the foreground actors and their projected background unless the two are unnaturally close together.

As has been proven abundantly during the past two years, the increased speed of such modern films as Agfa

Supreme eliminates both of these limitations, and gives the process the scope and the actuality which make it a technical and an economic asset of production.

Two years ago, a process screen twenty feet wide was considered a large one, and the use of a screen twenty-four feet in width was regarded as a daring experiment.

Larger Screens

Since the introduction of today's fast films, the use of twenty-four-foot screens has become a commonplace, and in certain studios projection-shots have been made successfully on screens half again as large. In one notable instance at least, a screen thirty-six feet wide was successfully used with the projector so positioned that the projected image "bled off" for six or seven feet on all sides of the screen: in effect, the entire projected image was more than forty-five feet in width. The composite camera was loaded with Agfa Supreme negative film, and the Directors of Photography responsible for this, the most spectacular achievement in process photography in the last season's releases, have gone on record as stating that these scenes could not have been made without this modern, ultra-sensitive film.

In more routine work, where extremely great screen-sizes are not required, the speed of modern emulsions is also valuable. With a highly sensitive negative film in the foreground camera, screen brightness is no longer the limiting factor in the composite exposure. It becomes possible to deliberately throw away a portion of this background illumination in the interests of improved quality.

Since the introduction of the projection process, it has been obvious to most thoughtful cinematographers that we were of necessity making sacrifices in the gradational scale of our projected background plates by using prints which were too light to give really correct gradation. We gained overall light transmission at the sacrifice of gradational value.

Improving Gradation

With a faster film, we can now use darker background prints, which will give us a more normal gradational scale. This will obviously enable us to match more closely the gradation of the actual foreground and the projected background.

In addition, it is sometimes possible to reduce the amperage of the projection arcs, thus subjecting the background film to less heat. This extends the useful life of these keys.

Since the introduction of today's fast films, projection-process cinematography has so enlarged its scope as to reach proportions which greatly aggravate the problem of securing depth of field in the composite shot. When it becomes necessary, as it has in some recent instances, to carry adequate definition from a near limit of less than twenty feet from the camera to a background screen seventy-five, a hundred or more feet distant, with lenses of normal focal length, stopping down is the only course which will give the desired focal depth. With a fast negative film in the composite camera and an amply powered background projector, this becomes possible. On shots where with the older Superpan-type film an aperture of $f:2.3$ might be needed, it now becomes possible with modern film to stop the

camera's lens down to $f:3$ or $f:4.5$, which virtually doubles the region of adequate definition.

Making Background Plates

Today's film types offer tremendous advantages in making the background plates, as well. For many types of night-effect backgrounds, the possibilities offered by Infra-Red negative are already familiar. If Infra-Red has become an invaluable tool in making production night-effects, it is an even greater asset in making background night scenes.

But many background plates require city night-effects, with street lamps, shop-windows and electric signs aglow. Scenes of this type on any large scale are naturally beyond the scope of any method of shooting in daylight with overcorrecting filters. They must be made actually at night.

Since the introduction of Agfa Supreme and Agfa Ultra Speed Pan, such shots can be made more easily and more convincingly than has ever before been possible. Exposed at normal lens apertures and camera speeds, these films, especially the latter, will record the normal lighting of such scenes: the windows, street lamps, and signs do not have to be specially lit to obtain a convincing effect.

Frequently it is necessary to obtain normal, day-effect background plates of distant locations, in places where the normal lighting conditions are photographically unfavorable, and where it may be impractical, or even wholly impossible to use any artificial lighting equipment. Today's high-speed negative films are invaluable under such circumstances. Where the light conditions are only moderately unfavorable, such emulsions as Agfa

Supreme may be used, to obtain the most satisfactory balance between high film speed and fine grain-structure. Where the light conditions are at their worst, such films as Agfa Ultra Speed Pan, offering the maximum of outright film speed, can be used to obtain the desired background without the expense and delay of using artificial lighting. Thus the film chemists have made it possible for special-effects cinematographers to obtain background scenes under circumstances and in places where two years ago no cinematographer could hope to work successfully.

Making Miniatures

Many of these same considerations apply to the photographing of miniatures. In this work, exposure has almost from the start been a limiting factor. As is well known, one of the fundamental tricks in making a photographed miniature appear convincingly large on the screen is to photograph it in slow motion—that is, at camera speeds four, six, eight or more times normal, depending upon the scale to which the miniature is built, the lens and angle used, and so on.

This ultra-speed camerawork inevitably shortens the time of each exposure tremendously. At eight times the present normal speed of 24 frames per second, or 720 feet a minute, with a shutter opening of 170 degrees, each frame receives an exposure of only $1/408$ th of a second!

Working under full natural sunlight, this introduces a definite exposure problem. Working under artificial light, the problem is greatly increased, for there is a limit to the amount of light that can be flooded

onto a small set, even with today's most efficient lighting equipment.

When you add to this the necessity of obtaining the maximum depth of focus in miniature shots, obtainable only by stopping down the lens of the camera, the value of today's high-speed films for miniatures can be appreciated.

At first sight it might seem that depth of field might be relatively more easy to obtain in a miniature than in a full-scale scene, since the set will be relatively small, and the focal depth needed far less than in a full-scale shot. But in practice, this is by no means the case: for in the miniature, the lens will probably be focused on a point considerably closer to the camera—and as the focus is brought closer to the camera, depth of field decreases with alarming rapidity. A 50mm. lens, focused at 25 feet, will at an aperture of $f:2.3$ give adequate definition on everything from 13 to 10 feet from the lens—a focal depth of 22 feet. But the same lens, used at the same aperture and focused on a point 6 feet from the camera, will have a depth of scarcely *one foot*.

This is a somewhat extreme example, but it will serve to illustrate some of the problems involved in miniature cinematography. In addition, it may explain one reason why some of the miniatures made on the old-type, slower films were unconvincing. They might be scaled right and photographed at the proportionately correct camera speed: but they exhibited a shallowness of focal depth utterly alien to full-scale scenes made under normal conditions. And though only the trained eye of the technician might be able to detect the reason, even the untrain-

ed eye of the layman could spot them as camera trickery and brand them as fakes.

With today's high-speed films, this situation, if not wholly eliminated, has certainly been minimized. The added speed now makes it possible to obtain adequate exposure at reduced apertures, even at extremely high camera speeds. The reduced aperture, in turn, yields increased depth of field which makes the miniature-shot intercut better with full-scale scenes, and gives the miniature an infinitely more convincing aspect.

This necessarily brief commentary on the relation between modern emulsions and special-effects cinematography can inevitably but briefly touch the surface of the subject. A great deal that could bear discussion has of necessity been left unsaid.

Nevertheless, I hope that these remarks will be sufficient to bear out the contention that modern special-process cinematography owes at least as much as production cinematography does to the advances brought by today's high-speed film products. When the history of special-effects or "trick" camerawork is finally written (and what an absorbing tale it will be!) two dates will stand out strongly above all others. The first will be 1931, when the first superpan-type emulsion appeared and made possible our present invaluable projected-back-ground process. The second, of almost equal importance, must be December, 1937, when the appearance of the first of today's super-speed films opened the door to advances which have so greatly multiplied the value of special-process camerawork to the industry.



PASTORAL

Photographed by E. E. Doughty



A difference of opinion may be what makes horse races interesting; but if the race is going to prove anything, all differences of opinion have got to stop short of the finish line. If you've ever put a couple of dollars on a horse's nose and capped the agony of a close finish with hearing some judge rule in his opinion another nag's schnozzle crossed the line first, you'll know what I mean. Not only you, but several thousand others, including the horse's owner, the sportswriters and everyone concerned except perhaps the horse himself, want tangible proof rather than personal opinions about that finish.

In view of this, and the really important money that changes hands in prizes and through the pari-mutual windows after each modern race, it is no wonder that the sportsmen and executives in command of America's most progressive racing plants have called on photography to take the guesswork out of race judging.

Both still cameras and cine cameras have been used for picturing finishes, but the latest and, according to expert opinion, the most accurate of race-finish cameras is neither a still camera nor a motion picture camera. It per-

It's a Photo-

By WILLIAM

forms the apparently paradoxical feat of taking still pictures of moving objects on a continuously moving strip of motion picture film and, less than a minute later, delivering to the judges an enlarged print showing the exact order in which each horse crossed the finish line.

Officially this camera is called the Photo-Chart Camera. It is the brain-child of engineer Lorenzo Del Riccio, well known in motion picture circles for his technical research activities in connection with sound and color at Paramount's East Coast studios. His first Photo-Chart installation was developed more than two years ago, and was first used at Bing Crosby's Del Mar track. Since then, the design and operation of the equipment has been refined and simplified, while the cameras have timed races on leading tracks from coast to coast. As this is written, Del Riccio and his Photo-



Chart Finish!

STULL, A.S.C.

Chart are recording the finish of every race at Hollywood Park, and by the time it is printed, they will be settling arguments at Del Mar for the third successive season.

Cine-technicians have often remarked that the pictures made by the Photo-Chart camera show a striking resemblance to the screen effect of "follow-shots" made with an Akeley camera. Actually, the basic principles which give such similar effects are closely similar, even though in detailed operation the two equipments have nothing in common. So recalling why the Akeley gives its characteristic results may help us to understand how Del Riccio, with a lens, an aperture and a moving film, but with no shutter, has created the most scientifically accurate system of race-timing yet known.

When a newsreel cameraman trains the telephoto lens of his Akeley to

follow a fast-galloping race-horse, on the screen we see (if he is a good lensman) a picture in which the horse gallops as though on a treadmill, while the background flows by in a smooth blur. The reason for this is that between the smooth-panning gyro movement of the Akeley, its accurate, matched-lens finder system, and the skill of the cameraman, the image of the horse remains stationary with regard to the frame, while due to the rapid panning of the camera, the image of the background moves so fast across the film that the shutter cannot "stop" it; hence the blur.

Much the same thing, but with reverse English, takes place in Del Riccio's Photo-Chart camera. To put it briefly, the film moves across a narrow aperture at the same speed, and in the same direction as the image of the galloping horse moves. Therefore the image of the horse is stationary relative to the film, and is recorded as a sharp picture, while the image of the background is a blur, as might be expected in a picture of a motionless object made on continuously-moving film.

The aperture is the heart of the Photo-Chart camera. Though it is

mounted high in the air on top of the grandstand, it is positioned with mathematical accuracy squarely on the finish line. The camera position is actually determined by surveyors, who align aperture and finish line with as great precision as might be taken in surveying the boundaries of one of those Park Avenue lots where a difference of a fraction of an inch might make a six-figure difference in price.



In the Photo-Chart camera the aperture through which the picture is made is an almost microscopically narrow slit, eight thousandths of an inch wide. A telephoto lens of the proper focal length (a $5\frac{1}{2}$ inch Cooke $f:2$ lens is being used at Hollywood Park) images the full width of the track on the film, which is directly behind the slit. The film moves past the aperture at a speed directly proportioned to the speed of the horses: it averages an inch and a quarter per second. In effect, this gives to each 0.003" section of the film an exposure of $1/35$ th of a second.

At this point anyone who has ever tried to "stop" the movement of a race-horse with a camera will rise to point out that you can't possibly "stop" the movement of a horse galloping at thirty-five or forty miles an hour with so slow an exposure. But some of the older hands at photography may remember how, long ago, back in the days before lenses or films were as fast as they are now, the news-

hawks learned that they could get by with slower shutter-speeds if in making such shots they panned the camera to follow the moving object. In other words, like the Akeley-camera picture, the movement of the camera with the horse keeps the image of the horse's body virtually motionless on the film, and naturally a slower shutter-speed will stop the movement effectively.

The same general thing happens as the film in the Photo-Chart camera moves past the slit. Film and image move approximately the same speed, in the same direction. Therefore the image is apparently motionless with respect to the film.

Actually, this works out so that as the tip of the leading nag's nose reaches the finish-line the moving film records its image. As the next section of the horse's head crosses the line, a fresh minute width of film is there to picture it—and so on until the last wisp of the horse's tail whisks across the line. And we have a picture of every section of that horse at exactly the instant it crossed the line! By keeping the camera going, we can make similar pictures of each of the other runners, in precisely the order in which each finished.

This gives us a negative bearing a latent image of the finish—accurate enough, but quite useless until it has been developed, fixed and, if the picture is to be of any value to the layman, printed as a positive, preferably an enlarged one.

So after the film leaves the camera section of Del Riccio's apparatus, it travels immediately through a small developing tank. In this tank is a developer which must be something like liquid dynamite, for it develops

a full image in a matter of a few seconds.

From the developer tank, the negative loops through a potent short-stop bath, and into a long, horizontal hypo-tank.

The bottom of this hypo-tank is glass. The top is open, and mounted under a lamp-house holding three No. 2 Photoflood globes, while a pair of rollers hold the film flatly in place. Beneath the glass-bottomed tank is the pre-focused lens of an enlarger, which projects the image downward to an easel holding a strip of enlarging paper about a foot long, fed from a roll in a light-proof magazine below the easel.

This strip gets a mechanically metered exposure, and is handed to an assistant who puts it through the quickest sort of tray development, stop-bath and fixing. A brief rinse, and the completed print is slipped between blotters and handed out to the judges—in an average time of 48 seconds from the instant the first horse crossed the line!

If the finish is a supremely close one, another pre-focused lens and a larger easel are slid into place, and an 8x10 print of the leading finishers can be made, to give the judges a chance for really precise measurements of those "won-by-a-nose" finishes.

Fully as ingenious as the camera itself are the auxiliaries developed by Del Riccio to simplify the problems of operation. To a remarkable extent, they eliminate the several variables which enter into the making of each picture.

The first problem in making any picture is of course exposure. In the Photo-Chart camera, the exposure must

be controlled by the lens aperture. To simplify this, a built-in exposure meter is provided. A suitably matched lens images the field on the electric eye of a common, commercially available photoelectric exposure meter.

The next question is how to match the movement of the film with the speed of the horses, which naturally varies somewhat from race to race. This is solved very simply. As the horses swing into the straightaway, the operator trips a timer, built into the Photo-Chart camera-housing, but essentially like the dark-room timing clocks that can be bought for a few dollars in any photo-supply store. As the lead horse reaches another marked point, this timer is switched off. In addition to the usual calibration of seconds on the timer's dial, this one is also calibrated in miles per hour. So on a fast day, if the timing-clock's needle points to 40, the operators know the bangtails are finishing at a 40 m.p.h clip, and need simply reach to an adjacent dial to place the film-moving control at 40, which will move the film past the slit at a speed precisely corresponding to that of the image of a horse moving at 40 miles per hour.



The final problem is that of timing the printing operation accurately. Since the camera exposure and neg-



ative development are accurately controlled, there should be relatively little variation needed in printing time: but since every second counts when prints must be rushed to the judges, it is certainly safer to leave the timing to an emotionless machine rather than to a human who might grow excited enough to unwittingly under- or over-time a print. Therefore the printing light is controlled by a

timer which looks like a overgrown telephone dial. If the negative density is such that a five-second exposure is indicated, the operator simply dials five—and the light goes on for exactly five seconds.

And how about safe-lighting the sensitive paper on which the prints are made? Very simple: the Photo-Chart camera is enclosed in an amply-dimensioned booth. Since the operators

must be able to see the track, not only to determine the speed of the horses, but to be able to start the camera at the right time, there must be windows. But these windows are glazed with red glass—about the same shade as a 23-A filter—which gives plenty of light to work by, yet is thoroughly safe for the printing paper used.

Naturally, with Del Riccio's cine-engineering experience, he has incorporated the most approved methods of solution control in the "laboratory" section of his machine. A circulating system draws solution from the top of each tank, whence it is piped down through filters to pumps which raise it to a temperature-conditioned reserve tank. From this it feeds by gravity to inlets at the bottom of each solution-tank, rising again to the overflow drain. In this way sufficient gentle turbulation is obtained to avoid directional markings on the negative, while the purity and temperature of the solutions are properly controlled.

But as inventor Del Riccio points out, it is not the ingenious mechanical construction of this camera which makes it unique, but a superior accuracy which has never been approached by any instrument of conventional design. "The Photo-Chart," Del Riccio will tell you, "is unique in that it is never 'blind.' Any conventional camera must inevitably have its intervals of blindness.

"To put it in easily understood terms, if you try to photograph any fast-moving action like a race finish with a still camera, you must rely on an almost incredible combination of skill and luck if you are to make your exposure at the precisely correct split-

second when, in this case, the first horse actually touches the finish-line with the tip of his nose. This timing is vitally necessary, for it is entirely possible that another horse, closing fast, might nose past him the barest fraction of an instant later.

"Much the same thing happens if you use a conventional motion picture camera, no matter how fast the frame-exposures follow each other. There is a dominant probability that at the true instant of finishing the camera's shutter might be closed, leaving the camera 'blind.' In a really close finish this would give you one frame taken a split-second before either horse reached the finish, and the next a split-second after one or both had crossed the line. You might easily have one horse ahead in the first frame and the other ahead in the second. It would be impossible to tell from the pictures which finished first: you would be forced to rule a dead heat.

"The Photo-Chart camera, on the other hand, 'has its eyes open' all the time. It photographs each horse at the precise split second each part of the animal crosses the line. Or, to put it differently, the Photo-Chart camera cannot photograph any part of a horse *except* at the exact instant that part of the animal begins to cross the line.

"In general, the Photo-Chart system makes it very difficult for the picture to show a dead heat unless the horses finish together, not only absolutely beside each other, neck-and-neck and shoulder-to-shoulder, but as perfectly in step as a pair of West Point cadets on dress parade.

"Occasionally, one horse will blanket another from the lens, so that it

is not possible to tell with absolute certainty which is ahead: and at some tracks where auxiliary lighting equipment is not provided, the lighting conditions late in the afternoon may cast long shadows from behind the horses, making it difficult to identify which horse's nose is ahead in any kind of a picture. In such circumstances most conservative judges will prefer to take the safe course of calling it a dead heat.

"But speaking broadly, I am proud to say that the record of the tracks where the Photo-Chart has been used shows this camera has reduced the frequency of dead heats by over seventy-five per cent. I believe the average of dead heats, summed up from the records of all the nation's tracks, whether or not they used any type of photo-finish equipment, is slightly over two per cent. In the many races that have been timed by the Photo-Chart, the average of dead heats is less than one-half of one per cent. In the current season at Hollywood Park, out of 283 races photo-charted to date, there have been but two dead heats!

"From the purely photographic viewpoint, the Photo-Chart system has definite advantages. For instance, even with today's fast films like Agfa Ultra Speed Pan, exposure in conventional cameras is a problem. Since 35mm. motion picture film is the most practical sensitive medium to use, we must

consider the question of grain in the fast-developed negative: any excess of grain could throw off the accuracy of the enlarged print, to say nothing of making the print difficult for non-photographic judges to interpret.

"The exposure given by the Photo-Chart camera is on the average about $1/35$ second. This gives us a chance to utilize the finest-grained film obtainable. After exhaustive tests, we decided that Agfa Finopan was that film. Its Weston daylight speed-rating—Weston 16—is ample for our purpose, even on cloudy days or late in the afternoon: its exceptionally fine grain-structure makes it superior to anything else for our use.

"At that, we can never be classified as one of Agfa's best customers, for, even in races where the 'also-rans' straggle along far behind the leaders, we rarely use more than eighteen inches or two feet of film to record the finish of a race. Actually we can photograph a whole day's finishes on less film than even a normal-speed cine-camera would use to film the finish of a single race!

"This makes it possible to give very careful attention to the camera and developing equipment between races. As each race finishes, a trimming knife cuts the film between the camera and the developing machine, so that only the film actually exposed is developed. After the prints are made, the developing section is un-threaded,



and its simple mechanism cleaned and checked. Then a length of colored blank leader is clipped to the film extending from the camera, and the wet end of the machine is carefully rethreaded with the leader.

"From this point until the printing operation, the operation of the machine can, if required, be made almost completely automatic. Photoelectric-cell circuits at the proper points along the track could operate the timer that indicates the speed of the horses, and another 'electric eye' could automatically switch on the camera as the lead horse intercepted a light-beam a length or so from the finish. In fact, in some installations we have used this automatic starting control with great success.

"But perhaps the most important single thing about the Photo-Chart system is the fact that it is the only race-finish camera in which it is absolutely impossible for optical distortion of perspective or minute inaccuracies in mounting the camera to distort the picture to favor the nearer horse. Due to the use of the moving-film-and-slit principle, and to the design of the slit itself, perspective distortion is eliminated. For the same reason, minor inaccuracies in positioning the camera—which would in a conventional camera system make the picture favor either the nearer or the farther horse according to the direction

in which the camera's optical axis deviated from absolute alignment with the finish-line—have no effect on the accuracy of the Photo-Chart camera. As long as the slit is so positioned that it is virtually an extension of the finish-line, no inaccuracy in the way the lens is pointed (so long as the field still includes the finish) can sway the Photo-Chart picture from its impartial accuracy!"

Clearly, this impartiality, together with the almost perfect elimination of even the chance of a dead heat, is what has persuaded the chiefs of so many leading tracks from coast to coast to install the Photo-Chart at their tracks, and to place, as they and the leading racing form experts do, such reliance in Photo-Chart pictures. But the unceasing miracle to the layman, whether he is a professional or amateur photographer or just Mr. Average Man, is that of watching a close finish and then—usually before the jockeys have all gotten back to the line—seeing a picture of that finish handed to the judges to squelch all possible differences of opinion. And once you've seen one of those pictures of a close finish posted, you know no argument is possible. Whether you lost your shirt on an 'also-ran' or on a nag whose nose just wasn't long enough to come in first, you're convinced!



FARM IN CALIFORNIA

Photographed by Fred R. Archer

Using Modern Films to Simplify Modern Problems

By MARCEL PICARD, A.S.C.

WHEN you think of buying an automobile today, you don't ask yourself, "Is this one a good car? Does its manufacturer know his business?" You know the maker could not be in business in so highly competitive a field if his product did not

incorporate good design, good materials and good workmanship. Still you realize that although all modern cars are good, some particular one of them will suit your needs better than any other; it will have proportions and features which, with your style of

driving, will make motoring easier and more pleasant.

It is the same with motion picture film. Nobody could afford to make a really inferior film stock today; the field is too competitive. But certainly you will find that one film or another will have characteristics which will make your work as a cinematographer easier and more efficient.

For many years now I have used Agfa films: I made many beautiful pictures on the old Agfa Superpan, and more recently I have used the newer Agfa Supreme. The Agfa Infra-Red negative I have used since the first day it appeared. I use them not merely because they are good film products—that is to be expected—but because I find they make my work better and more efficient.

New Problems

Today the cinematographer, whether he is working in a major studio or on an independent picture, has to meet problems he never faced a few years ago. He has to work faster, and yet turn out better camerawork than ever before. In the old days of silent pictures, a production did not have to be very important to have a schedule of three or four weeks' shooting, while a really big super-production could be shooting for six months or a year without being considered unusual. I have made some that involved as much as a year and a half or even two years of camerawork.

Today, it is, as everyone knows, very different. An independent or program picture may be allowed anywhere from six to eighteen days of shooting, and an "A" picture which takes more than two months of camera-

work is considered a most exceptional—and costly—epic.

With all of that, the cinematographer, in either case, is expected to deliver photography infinitely better than the best of only a few years ago. Even the cheapest of "quickies" counts as a matter of course camerawork which is far superior to that of the best super-production of ten or fifteen years ago.

It is no wonder, then, that the cinematographer of today is constantly looking for anything in film, equipment or methods which will simplify the mechanical parts of his work, and leave him more time to concentrate on his fundamental task of putting creative artistry on the negative.

It is in this that I find Agfa Supreme and Agfa Infra-Red negative films so useful. Much of my work lately has been done for independent producers who, though they may not have so much in time and money to lavish on their pictures, none the less expect—and are entitled to get—the best possible photography in their pictures. Many of these assignments require that we make a complete feature-length production in from six to eight days of shooting. This in turn means making fifty or sixty camera set-ups a day, and working early and late to keep schedule and budget intact.

Agfa Supreme is an ideal film for this sort of work. When conditions are normally good, the film has an inherent brilliance which is most pleasing, without being in any way over-contrasty. But it is amazing when you find yourself forced to work on dull days, or late in the evening to meet a schedule. Then it picks up faint

gradations of lighting your eye can't even see. No matter how dull the lighting is, Supreme always seems able to pick up enough traces of soft rim lighting to outline the faces and figures of your actors, so that they stand out as nicely, often, as though the scene were made under much more normal conditions, and with the benefit of 'booster' lights or reflectors.

I have frequently had actors and director alike look at me as though they thought I was crazy when I told them that with Supreme I could still manage to get that one last, important scene not only after the sun had set, but after the evening was beginning to merge into night. Some of them have argued that even though the film was fast enough to yield an exposure, it couldn't possibly give us a good picture under such impossible conditions. But so far, Supreme has given them a pleasant surprise when the rushes were screened: not only was the scene adequately exposed—it was good enough photographically to intercut successfully with scenes made earlier, under far more normal illumination.

Using filters on Supreme is another point in which I have found this film advantageous. Personally, I like a fairly heavy correction: I do not always want a black sky, but I certainly want to keep the sky definitely darker than a bare, un-corrected white. At the same time, particularly in rugged action pictures, it would not do at all to let faces become white and "washed out."

Of course filtering is to a great extent a matter of individual taste and technique. For my part, I do not care for the indefinite effects of the lighter

yellow and orange filters; I prefer the more positive correction one gets from the red ones, like the 23-A, 25-A and 29-F.

Simplified Filtering

Using either of my two favorite filters—the 23-A and 25—on Agfa Supreme, I get just the effects I want. Giving a rather ample compensation, I can darken the skies to just the right degree, yet at the same time I do not sacrifice the faces. If anything, the slight lightening of face tones is an advantage, for practically none of the male actors in my pictures wear make-up, and the filtering helps to offset the effect of their bronzed, sun-tanned skins.

But even though I believe in using only a few filters, I certainly do not agree with those cinematographers who, when they go out of the studio, make it a rule to slip one filter into the camera and leave it there. Atmospheric and lighting conditions can change too much for that! But with only two filters—a 23-A and a 25—one can generally meet most conditions, and still keep his scenes well matched on the screen.

For instance, when I am shooting at an angle well away from the sun, and have a clear blue sky with which to work, I use the lighter filter—the 23-A. Then when I come to a reverse-angle, shooting more toward the sun and the paler sky that surrounds it, or when I am making related scenes on another day, with a less clear sky, I use the heavier 25-A, and keep the correction and sky values closely uniform in spite of the changed conditions.

For making night-effect exteriors,

there is of course nothing quite like Agfa Infra-Red negative. In the old days, we naturally had to make our night exteriors at night, with expensive lights. As a result, if we had many night scenes in the script, we had to expect to spend more time and money on the picture.

Today, I use Infra-Red whenever the script calls for an outdoor night-effect. In one recent production fully one-third of the picture was made in night-effects, on this film. And the night-effects were more convincing than any I ever got with lights at night. In addition they were easier to make, and took less time and trouble.

I have found that Agfa Infra-Red is a surprising schedule-saver. With it you can not only make night-effects all day long, but you can keep on making them surprisingly far into the later and less photogenic hours.

Night Effects

When the light is favorable, I follow the usual method of using the Infra-Red film and a 29-F filter. However, I give a more full compensation than I believe the Agfa experts advise. If I recall correctly, they suggest using a factor of 6; I prefer to give a factor of 8; for if you have it on the negative, it is easy enough to print a scene down a bit to darken it—but if it isn't on the negative, no amount of laboratory trickery can give you a picture.

But later in the day, as the light grows weaker and more yellow, the flexibility of Agfa Infra-Red permits one to keep right on shooting convincing night-effects. For as the light grows less ideal, and more ruddy, you need only change to lighter and lighter filters to keep your exposure and your

effect uniform. And when schedules are short, you have no idea what an asset it is to be able to switch first to a 25-A, and later to even a 23-A—and still keep on getting uniform and convincing night-effects while you make those last few vital shots.

Some cinematographers—especially, I believe, those who have not tried seriously to use the film—have sometimes held that they could not easily light up windows and the like for Infra-Red night-effects. Perhaps I have been doing it so much I've forgotten my own first worries over the problem, but I do not remember having any difficulties in this direction.

Really, lighting windows for Infra-Red night scenes is a very simple matter. You can use booster lights, if you have them. If you have not, you can do as well, if not even better, by simply using reflectors intelligently.

Where I can, I do the trick by simply placing a reflector in the proper place behind the window.

When this cannot be done, I use two reflectors: one behind the window, and another outside the window, reflecting light into it. In such a case, of course, I have to be careful to mask the outside reflector so that it does not scatter its beams where I don't need light, outside the window on walls and window-frames. But this is of course a simple matter. Sometimes I have "lit" half-a-dozen or more windows this way.

In general, you see, I have used these two films to simplify the mechanical phases of cinematography. It is not only the skill, but the time and energy a cinematographer can spend on the creative parts of his work that make him truly of value to his production and its producer.



FASHION STILL

Photographed by Leon Miller



ON THE LINE

Photographed by Leon Miller

Shooting Stills for An Air Line

By LEON MILLER

Staff Photographer, United Air Lines

From an elusive camera-dodger to sleek Mainliner against a background of fleecy white clouds—from “leg art” to highly technical close-ups of a new motor or blind-flying aid! These and many more varied subjects are some of the daily assignments received by the photographic department of United Air Lines.

In this air-minded age, almost everything that touches aviation is news. With the spread of photographic journalism, editors everywhere clamor to have that news told in pictures, or at least supported by pictures, especially when the “story” has or can be given the glamorizing twist of an aviation background. It is the airline photo-

grapher's job to supply those pictures, no matter what they may be.

Of course, much as we and our partners in the airline's news bureau would like it, newspapers and magazines can't continually be printing pictures that merely show our pet Mainliners or their crews in action. There's a limit to the amount of space that even so spectacular a ship as the 65,000-lb., 240-mile-an-hour DC-4 can grab; and in a year or so, when there is not one but a whole fleet of these big fellows freighting United's passengers from coast to coast, their news value as airplanes will drop pretty close to zero.

But the lastingly important part of an airline is not the ships or the crews, but the passengers. In the aggregate, they may be merely integers that build up the totals in the statisticians' figures; in the individual, a gratifying number are likely to be newsworthy personalities.

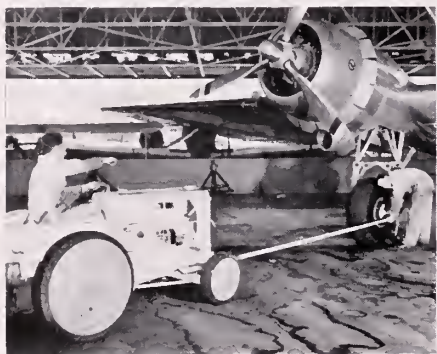
If Maestro This flies in to conduct a concert at the Hollywood Bowl, or Senator That arrives by air to make a speech—it's news. If your favorite movie star flies east to attend the premiere of her new picture, that's

news, too. The newspapers and often the syndicates will make very good use of such pictures—and if these personalities are pictured boarding or leaving a United Mainliner, it will certainly do the Line no harm!

In addition there are often less famous passengers who are colorful newspicture subjects. A busy executive, pictured making his forty-seventh transcontinental flight by Mainliner: a three-months-old baby being chaperoned across the nation by a relay of United's pretty hostesses: a nonagenarian Civil War veteran, too frail to risk any other form of transport, flying to attend a G. A. R. encampment—all these are subjects that tickle the interest of both editors and their readers. And the fact that they chose to fly by a given airline is likely to make other folks decide to follow suit.

The other journalistic extreme is represented by the thousands of readers interested in the technique of private and commercial flying, and the half-dozen or more magazines that serve them. Perhaps a writer for one of the popular flying journals wants pictures for a story—illustrated—on a "million-mile" pilot's experiences in instrument flying; and another, more technical one, asks for details on the system used to keep United's planes, engines or instruments in unfailingly perfect condition. All of them call for pictures, often for pictures made under adverse conditions. We've got to deliver them.

As if this wasn't quite enough to keep our photographers and news experts from growing bored, there are special requests from the newspapers and syndicates for special pictures. Since its beginning some two years ago at the Union Air Terminal in



Methods of handling the big Mainliners in the hangar make pictures that interest aviation magazines.

Burbank, California. United Air Lines' Photographic Department has become an informal clearing-house for aerial newspictures of every sort. Not only the airline's staff photographers, but pilots and planes are on call twenty-four hours a day to help Southern California's newsgathering agencies give their readers accurate reports and pictures of important aeronautical events and news happenings as seen from the air. In many instances the air route is not only the quickest, but the only way a major disaster like a flood or forest fire can be reached.

At any hour of the day or night the airport phone is likely to ring and some editor say, "I hear a dam has broken here, or a crack train been wrecked there—be a good fellow now and send someone up there in a plane to get me a story and pictures!"

A few minutes later a United plane will roar into the air, bound for the scene of the disaster. A few hours later hundreds of thousands of Californians and, if the event is of sufficient importance, uncounted others in cities serviced by the wired-photo syndicates, will open their morning papers and view pictures of the event, photographed, as the caption tells them, from a United Air Lines' Mainliner!

As every newspaperman knows, the coldest thing in the world is yesterday's news. Accordingly, the airline picture-maker often has to work as fast as any newspaper photographer. His pictures must be delivered while news is "hot," and they must combine all the qualities of definition, tonal rendition and gradation that make a print good for newspaper and magazine reproduction.

This means the use of photographic

materials which can be depended upon to give outstanding results under any conditions, not only in the photographing, but in the laboratory as well, for the job isn't finished until we have handed the newspaper or magazine editor a perfect print to send to his engraver and presses.

It is only natural that under these circumstances United's photographic department follows the example set by the leading newspapers all over the country. Since the department's beginning, two years ago, Agfa products have played a prominent part in producing eye-catching pictures seen in both local and national publications.

Agfa Superpan Press and Agfa Super Plenachrome Press have been used exclusively. On all general shots, the panchromatic material is used. In some cases, however, it is necessary in serving our own ends as well as those of the newspapers, to see to it that reds—as in the lettering used on the Mainliners, reproduce as black instead of gray. For these pictures the Super Plenachrome is used. As it is not panchromatic, our red lettering comes through a sturdy black; yet even though it lacks fully panchro-



Santa Anita on Handicap Day—photographed from the air for the newspapers by a United Air Lines cameraman.

matic correction, the film gives a very pleasing rendition of face tones and textures.

Both of these films have the extra speed which gives a welcome margin of safety when rapid focusing is necessary. This means that we can use smaller lens stops, which give increased depth of focus and improved overall definition. When working in the air, it means we can use shorter exposures, to be sure of offsetting not only the speed of the plane, but the otherwise imperceptible vibration of the powerful engines.

In addition, we've found that Agfa films have a delightful quality of brilliance, as distinguished from excessive contrast, which helps a lot in producing the good, snappy prints needed for good newspaper and magazine reproduction. This can hardly be stressed too much, for mere strong contrast becomes exaggerated through the reproduction processes and can often be distorted into an unpleasant "soot-and-whitewash" effect, while the brilliance we get from Agfa negatives is a very different thing, and gives a pleasing sparkle to the final result.

Fine-grain characteristics are important to us. Practically all of our pictures are made with the newsman's standard equipment—the 4x5 Speed Graphic—and enlarged prints, 8x10 or larger, are made from these comparatively small negatives. A print whose grain structure proclaims it an enlargement is useless for our purposes, and especially for pictures made for magazine reproduction where "slick" paper and really good printing and engraving show up all the good—and bad—points of a picture. It is a tribute to the Agfa materials

we use that our 8x10's have repeatedly been taken for big-negative contact prints.

A generous proportion of our stills are shot with synchronized flash-globes. Working in the darker recesses of hangar or repair-shop, the flash is necessary. And working outside, where we often have the problem of balancing deep shadows with the highly reflective expanse of the polished metal fuselage of a Mainliner, the flash is invaluable. We use our speed flashes much as a studio cinematographer would use reflectors or "booster" lights under similar circumstances—and with similar beneficial results.

Both of these films lend themselves admirably to the rapid processing necessary in the newspictures we make for local papers and for the syndicates. Superpan Press, we have found, develops and fixes in about two-thirds the time required for other makes. In wet-negative printing, the water smooths out on the surface instead of forming droplets which would show up in the print.

The final, but by no means the least important link in the chain is the paper used in making the print. Brovira paper, with its extra latitude in printing, saves on remakes, develops rapidly, and gives us, even in rush prints, the sort of quality usually associated exclusively with Salon prints.

The first requirement in any photographic business—and especially in one like ours which seldom permits retakes—is the use of dependable sensitive materials. Experience in making thousands of pictures of all kinds, and under all conditions, has convinced us that Agfa certainly fills the bill!



OLD ANCHOR CHAIN

Photographed by Fred R. Archer

Our Illustrations

OUR frontispiece this month is from the camera of *Truman D. Vencill*, a leading light in that group of younger photographers who have come into prominence along with the rise of the miniature camera. We're proud to fall into line with the nation's leading magazines in printing *Vencill*-pictures. Making this particular shot, *Tru* deserted his usual *Contax* for a Zeiss-Ikon *Juell*, but as usual kept it loaded with *Isopan*. Rising in another sense,

Franklin S. Allen, the air-minded Los Angeles Manager of *The American Weekly*, is back again on our title-page with another striking aerial shot, made over Treasure Island from the Goodyear blimp, and as usual with his trusty *Contax* and *Agfa Supreme*.

The studios have heard all too little of late from *Fred R. Archer*, famed for years alike among studio folk and pictorialists as a master of the still camera. He has been busily teaching

the young idea how to shoot pictures in the Photographic Department of Los Angeles' Art Center School. His pictures on page 22 and page 31 give eloquent evidence that he is one teacher who practices excellently what he preaches! And on pages 6 and 13, we

get a hint as to why the standard of competition in the *Paramount Studio Camera Club's* contests is so high: *Ed Doughty*, who made those pictures, is a frequent contestant. His pictures, like *Archer's*, were made on *Agfa Superpan*.

Of Interest to All

Photo-Lab Index

There have been many excellent photographic reference-books published from time to time, but so swift and constant is photographic progress that most of them were scarce off the press before changes in materials or advances in technique have outmoded them in part or in whole. *Henry M. Lester*, of the miniature-camera combine of *Morgan and Lester*, evidently realized this, and when he started the task of compiling an up-to-date photographic reference volume, he reasoned that if you put two and two together you might get a perpetually up-to-date book. At any rate, that is what he has done: his latest book, *Photo-Lab Index* (Morgan and Lester, N. Y., \$3.50) is issued in an ingenious linen-covered, waterproof, loose-leaf binding, and quarterly supplements are to be issued (the first two free to registered owners of the basic volume) to keep the work perpetually abreast of photographic progress.

Even without this unique feature, the *Photo-Lab Index* is a book that should be in the hands of anyone who practices photography in either a professional or an amateur way. The range of useful information covered is incredible. There is the latest authoritative data on film speeds—in terms of Weston, European and Am-

erican Scheiner, Din, and all three variations of the H. & D. ratings; filter-factors for virtually every type of film with every type and make of filter.

Formulas for all recommended developers are given, and in addition, time-gamma-temperature development charts for each film in each developer.

Equally comprehensive data is given for materials of all makes, including not only negative but printing and enlarging papers. There is a very valuable section on Mazda, Photoflood and Photoflash illumination.

All told, *Photo-Lab Index* is one of the most practical and lastingly useful photographic works we've seen. Every photographer should have a copy.

New Agfa Home Movie Films

Users of 16mm. and 8mm. home movie cameras will want to try *Agfa-Ansco's* two new home-movie films. For the "8" enthusiast, *Agfa Twin-8 Hypan*, with a daylight speed of Weston 24 and an artificial-light speed of Weston 16 is now available, priced at \$2.25 for a 25-foot double-run 8 roll. For the 16mm. filmer, the newest and fastest reversal film available is *Agfa Triple-S Fine-grain Superpan*, Weston 100 to daylight, 64 to Mazda light. It comes at a sensible price in spite of its speed—\$6.00 for a 100-foot roll and \$3.25 for a 50-foot roll.



Agfa Announces Two Great New Papers

CYKON for contact prints

The greatest technical improvements in many years are incorporated in Agfa's two new sensitized papers . . . *Cykon* and *Cykora*!

They are particularly suited to the infinitely varied demands of motion picture studio still work. For every type of subject from gallery portraits to candid news shots and technical reference stills, *Cykon* and *Cykora* will give you a better print, more easily.

Cykon is for contact prints . . .

CYKORA for enlargements

Cykora for enlargements . . . Both have very similar characteristics. Both give rich, warm tones that may be controlled over a wide range through modification of development, or after-treatment. Both emulsions offer wide latitude in standard developers, and low sensitivity to safelights.

Begin *now* to work with these two finest and most modern of all photographic papers!

Made by Agfa-Ansco Corporation in Binghamton, New York.

FILM - PAPERS - CHEMICALS





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SEPTEMBER-OCTOBER 1939



MOTION PICTURE TOPICS

W I L L I A M S T U L L - A . S . C .

E D I T O R

Contents

TIMELY TOPICS	2
PIONEERING EXPOSURE METERS IN 1928 By JOHN P. FULTON, A.S.C.	7
FINE-GRAIN PORTRAIT STILLs FROM 35MM. MOTION PICTURE NEGATIVE By WILLIAM STULL, A.S.C.	12
"COVERING" JOHN COBB'S ASSAULT ON THE WORLD'S SPEED RECORD By TRUMAN D. VENCILL	19
FLYING HIGH <i>Photographed by</i> JOHN P. FULTON, A.S.C.	<i>Frontispiece</i>



MONTEREY SEASCAPE

Photographed by Bob Levy

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Timely Topics

EUROPE is at war.

That statement, screamed from the headlines of the nation's newspapers, has given the studio world a fair start toward a panic. It indicates—so many cautious folk argue—that the vital forty per cent of film grosses contributed by the foreign market would be cut off, or at least materially reduced. Accordingly there has been a great deal of very loose and panicky talk of “retrenchment”—of big productions indefinitely postponed—of slashed budgets—of widespread salary reductions.

We cannot join in the general jitters. As we see things, neither logic nor the past experience of our industry can support the present panic. On the contrary, both could very easily prophesy a boom of unprecedented dimensions.

Let's look at the worst side of the ledger first. A glance at any war-map of Europe shows that one group of belligerents will be definitely blockaded. The other, due to the submarine, may find foreign commerce hampered, but hardly cut off. We in Hollywood may therefore expect to continue to send films—if there remains a demand for them—to the latter countries; we cannot expect to send them to the former group, if the blockade is anywhere near effective.

But now a glance at the ledgers of most of our major producing and distributing firms will reveal the fact that for several years Hollywood has sent virtually no films to Germany and Italy, while Great Britain, France, and

to a lesser extent the other and (at this writing) neutral countries of Europe have formed a lucrative market for Hollywood's product.

So what?

The market which for several years Hollywood didn't have—did not perhaps even want to have—has been made inaccessible by war. The rest of the European market—a field which in spite of quotas and absurd nationalistic restrictions, has for years showed a marked preference for Hollywood-made pictures—remains open to us. Due to wartime conditions it may be more difficult to transport our product to this market—but the market is still there, and open to us.

Point two in the arguments of our Caspar Milquetoast brigade is that any nation engaged in a serious war would have less need of movies—would, in fact, be likely to close all theatres as a measure of wartime safety. Therefore, even if we could get our films to those theatres, they could not get any playing time.

To all of which we'd like to reply “poppycock!” If these people were alive during the last war, they certainly heard the word *morale* very frequently. Translated into simple English, it means the spirit of a people. If that people is at war, it needs entertainment—something far removed from the harrowing seriousness of war—to keep up those spirits. Experience has proved that the greatest booster of mass morale is the movie. It reaches more people more completely than any other medium.

Therefore we predict that not only the neutral nations of Europe, but also the warring nations to whom we can ship our films will not only reopen their theatres as a matter of policy, but will clamor for pictures—even to the extent of relaxing existing bars against American or other pictures.

To keep open, theatres must have product. The three great production centers of Europe are at present England, France and Germany—three nations now at war. Their studios will in all probability be closed—if they are not already closed—“for the duration of the war.” *No other nation in Europe can produce motion pictures in sufficient quantity, or of sufficient quality to supply their theatres. That task is strictly up to Hollywood.*

We do not want to suggest, or appear to suggest that Hollywood and its motion picture industry could be so heartless as to wish to fatten on the misery of Europe's millions. Indeed, we know that Hollywood can be generous and sentimental to a fault. But when foreign audiences, not directly impoverished by war's devastation, clamor for entertainment, and are willing to pay for it, we would be less than human if we refused to supply it and reap the rewards.

A thoughtful glance at the past will substantiate this reasoning. In 1914 the American motion picture industry faced a very similar problem, with the exception that several European countries—notably France and Italy—were at that time the unchallenged leaders in film production. Then came the great war—to American eyes fully as inevitable and fully as sense-

less as the present conflict. European production died on the battlefields. American production was called upon to supply the theatres of the world. Charlie Chaplin, Bill Hart, Mary Pickford and Douglas Fairbanks gave emotional relief and entertainment to audiences in London, Manchester, Paris and Marseilles as surely as they did to American audiences in New York and Keokuk.

When America entered the war—an experience which we all hope will not be repeated, but which must none the less be remembered—we found it our patriotic duty to keep on making pictures “to keep up the morale of our own people and our allies.”

When the war ended, American movies were unquestionably supreme throughout the world. Profits had reached new peaks; salaries had skyrocketed dizzily. Where a player was receiving \$150 a week before the war, he was now receiving close to a million a year, and still paying his producer a handsome profit. Where before the war a super-picture might cost a hundred thousand dollars, after the war a genuine million-dollar budget was profitable. As all of us have seen, not even the introduction of talking pictures nor the creation of artificial nationalistic barriers have served to halt the march of success which followed.

We're not prophets—but history has a way of repeating itself, and the stage certainly seems set for a repetition now. Perhaps the present near-panic will do some good in the elimination of some of the present obvious inefficiency in production, and in awakening our producers to the pos-

sibilities of the virtually untouched Spanish-American market.

But in the long run it seems exceedingly likely that history *will* repeat itself for the American motion picture industry. If Hollywood will only be smart enough to forget its petty internal squabbles and get down to the business of making pictures, the world market still exists, and with greater possibilities. If greater rewards are possible for successful productions, the creators will certainly share increasingly in those rewards.

The heads of the Warner Brothers' organization have recently taken action in support of this reasoning. They have issued a statement which says in effect that in spite of the war, production will continue unabated; that salaries will *not* be slashed; and that American films—at least in so far as the Burbank plant is concerned—will avoid all semblance of partizanship or propaganda, so that audiences in any nation able to obtain and pay for the films may see them and find them acceptable.

In other words, we might paraphrase the late Arthur Brisbane and say, "*Don't sell American films short!*"

* * *

W. M. THACKERAY is of course best remembered as the author of "Vanity Fair." But one Christmas, in his spare time, he dashed off a fairy-tale which in addition to the usual pluperfect hero and heroine included a really unique fairy god-mother. This potent personage, it appears, grew tired of eternally waving her magic wand and bestowing perpetual good fortune on her god-children. Instead, she crashed the gate at the birth of a princeling and

remarked that the best she could wish him was a little hard luck. This, in due time, he promptly got, and his abilities were so sharpened by adversity that he eventually became a much better ruler and man than he could have been otherwise.

We've thought of this ungentle fairy several times of late when in casual dinner-table conversations with members of the camera profession the discussion has turned to any of several cinematographers.

One of them endured a period, several years ago, when no producer in town would have given him a picture, even if he had agreed to work for nothing. Previously, he had been among the "tops" of the town—and folks were beginning to say, "Well, so-and-so has a big reputation, but between you and me, don't you think he is sort of coasting along on the laurels he earned years ago?"

But when at last one producer gave him a chance, after nearly two years of incessant hard luck, that cameraman dug in his toes and proceeded to show the world that he was still worthy of top ranking. He has since won an Academy Award for his cinematographic achievements, and in addition he has deservedly received unusual critical praise for his artistry on other important productions.

Today, when you meet him on the set, he is bubbling over with enthusiasm. "I'm giving it everything I have," he will say. "It's going to be one of the most beautifully photographed pictures ever. I'll show them I'm still as good as I ever was!"

Another man, after a moderately successful career, received a bad set-back, and today he is carving out

a better career as a specialist in outstanding exterior photography. Another, apparently out of luck as far as Hollywood's studios go, has become one of the top cinematographers of Mexico.

The point we'd like to make is this: that while we certainly don't wish anybody any hard luck, we'd like to remind the men who today are enduring greater or lesser periods of personal depression that anybody can have bad luck, but that the man who really has the stuff doesn't by any means have to remain on the canvas and be counted out. On the contrary, he can get up, go in there punching, and win!

In the same breath, we'd rather like to ask some of our other friends who are today among the industry's tops, if they can honestly say they have the same incentive that drove them up to success when they were young cinematographers, just fighting their way up from obscurity? We know, and they know that they have ability: but what use is ability if it isn't coupled with a will to "show the world" on *every* picture? What use is Academy Award reputation or skill if it takes the easiest way on any production with a budget of less than a million or so? If it complains when assigned to a "B" picture? This goes for directors, executives, writers and players too, if you insist.

This industry was made great by folks who were fighting their way up from obscurity—folks who were battling tremendous obstacles, but who were inspired with the idea that they had something better to offer than anyone else. It's got to be maintained by the same spirit.

SEVERAL times in the past we have commented on the fact that the Agfa Ansco Corporation is an American firm, giving employment to more than 3,000 American working men and women. Realising that our modern civilization is an intensely complex organization, we've forborne to guess at how many others such a firm might support. But in a bulletin published by the Los Angeles Chamber of Commerce we have recently noticed statistics that give an indication of what this might be. Since the Chamber's figures were for a firm with 1,000 employees, we simply multiply by three, and arrive at a figure which is certainly on the conservative side.

Based strictly on averages, a firm directly employing 3,000 people provides family support for not less than 9,000 individuals. In addition to that, the firm, through its employees and their needs, provides business for 30 grocery stores, 24 bakeries and restaurants, 9 clothing stores, 9 shoe stores, 6 hardware and building material firms, 3 furniture stores, a dozen drugstores, dry-goods, stationery and notions establishments, 9 auto accessory dealers and service stations, 3 music, radio and optical stores, and 3 tobacco shops. When to this is added the number of other people directly engaged in transporting, selling and manufacturing not only the firm's own products, but also the products bought by these employees, you reach a really surprising total.

Add to this fact that all these people, when gainfully employed, mean just so many more potential customers for many other things not listed in this survey, including, you may be sure, our own industry's pro-

duct of motion picture entertainment. Finally—and of particular significance at this time—it must be remembered that each of these people, in private employ, means another name on local and national tax rolls, and fewer on relief. The whole involved chain can be briefly summed up as forming a really impressive contribution to national prosperity. We're proud of it.

* * *

As this is written, many of us in the motion picture industry are watching our children start off on the adventure of a new school year. Soon we'll be helping Johnny with his home-work, and remarking to our friends how amazingly methods of teaching have improved since our own school days.

There's one change of which we of the motion picture industry should take special notice. This is the increasing use made of 16mm. moving pictures as a means of teaching. The next time Junior remarks that his school showed a movie, why not ask him about it? Don't jump to the conclusion that the film shown was a professional feature, screened merely for entertainment, or that it was simply a 16mm. print of some outmoded professional travelogue, or a dry-as-dust "educational" subject crudely made by some highbrow professor. It may be a professionally-made subject—but it may also be one made by actual teachers and students to teach, in the most graphic possible way, some necessary and practical lesson.

For instance, last year in a Long Beach junior high-school, a class of average students, with only the general supervision of a teacher, produced a one-reel 16mm. picture demonstrating

the dangerous and the safe ways for children to ride their bicycles in modern city traffic. It was written, acted, photographed and titled by the children, and aimed to make audiences of school-age children more safety-conscious. It was based on the actual experience of one of the students, who rode his bike carelessly—and had plenty of time to think of safety while he lay in a hospital bed. No professional film could have delivered its message with more sincerity.

In Akron, Ohio, a series of films has been made carrying the message of fire prevention in terms of action understood by children of school age. So successful have these films been that the Akron schools, supported by public-spirited citizens, have established a complete 16mm. studio so that more such films can be made.

In Santa Cruz, a field expert from the University of California has for some years been making his own 16mm. films—on Agfa reversal film, by the way—to show California's ranchers the latest methods of stock-raising.

In almost every modern school there can be found material which could advantageously be made into a 16mm. picture. Many of our readers, we know, enjoy 16mm. movie-making as a hobby. If, as most parents do, they want to bring themselves closer to the school activities and associates of their children, we can think of no better way to do so than to devote a little of their spare time to helping the youngsters and their teachers make such practical school-films. And we can assure them that the youthful enthusiasm they'll get from their young co-workers will give them a new enjoyment of movie-making.



DESERT LANDSCAPE

Photographed by John P. Fulton, A.S.C.

Pioneering Exposure Meters in 1928

By JOHN P. FULTON, A.S.C.

SINCE the introduction of today's high-speed emulsions, photoelectric exposure meters and their use have been a leading topic of discussion among cinematographers. It is significant that the discussion rarely centers on whether such meters are or are not helpful, but instead upon how best to use existing meters, and sometimes upon principles which might make a meter more universally applicable to studio cinematography. A great deal has been both said and

written about nearly every phase of the matter.

One article in particular impressed me. It was one in which C. Roy Hunter, writing in a recent issue of *AGFA MOTION PICTURE TOPICS*, stated that in his estimation the ideal meter would be one which measured the light actually making the exposure, taking its reading through the same lens system used in making the picture.

Possibly I was biased in favor of Hunter's idea because I had proven

it to myself by making and using a meter which worked that way eleven years ago, in 1928. That of course was several years before any of us in the motion picture industry became aware of the light-measuring possibilities of the photoelectric cell, so my meter did not make use of an electric eye. But it measured the light transmitted by the camera's lens, and was an integral part of the camera. Compared to today's meters, it was undeniably crude—but it worked with gratifying accuracy. And that, after all, is the real proof of any piece of equipment.

Solving Tropic Exposure Problems

My meter was developed to simplify a specific problem. I had been assigned to photograph Henry King's production "Hell Harbor," much of which was to be filmed on location in Florida. As every cinematographer knows, exposure and filtering under unfamiliar, tropical conditions can be amazingly deceptive. I had heard so many harrowing tales of cinematographers whose judgement had been fooled by tropical light conditions that I resolved to spare myself similar embarrassment if it was at all preventable.

Some means of actually measuring the light was clearly the key to the problem. I decided that if I could find some method of making a direct comparison between the illumination on my ground glass and a positive of known correct exposure and density, I ought to have a pretty accurate guide to correct exposure.

To make this possible, I began by attaching an illuminated carrier for my positive standard to my Mitchell camera. First I cut a small hole in

the top of the tube housing the focusing microscope, directly behind the ground glass. Above this I soldered a pair of clips to hold my transparency-carrier in place.

Then I built the transparency-carrier.

From a focusing flashlight I took the globe-socket and reflector assembly, with enough of the fibre case to make my housing. Then I built up an assembly of flat brass, crudely cut to shape, to hold an opal glass diffuser and beneath it my standard positive. This was soldered to the screw-threaded ring which had originally held the flashlight's lens in place: it screwed onto my tiny lamp-house, and in turn slid into the clips that held the entire device on the camera. The lamp could be focused in the same way the flashlight focused—by tightening or loosening a cap which moved the lamp-bulb in or out with relation to the reflector.

Reflex Comparator

With this done, I removed the little sliding port which ordinarily gives access to a Mitchell's focusing system. In its place I fitted a similar plate which carried a little lever, at the inner end of which was mounted a small mirror, about half the size of the frame. By moving this lever I could either drop the mirror out of the way or bring it into a position where it reflected the image of my standard positive down and backward into the camera's focusing system.

Since this mirror was only half as wide as the frame, when it was in the reflecting position one saw half the ground glass image on one side of the magnifier's field, and on the other side half of the standard positive.

Since the positive was mounted at the same distance from the magnifier's optical system as the ground glass, both were brought into focus by the same adjustment of the camera's focusing system.

The flashlight globe behind the positive was supplied by a battery mounted in a small case on the tripod. On this case there was also a rheostat and a milliammeter. Thus it was easy to standardize the illumination of the positive; all that was necessary was to manipulate the rheostat to give a standard reading on the milliammeter, and one could be sure the illumination on the positive would be at the desired standard.

Practical Operation

In actual use, all that was necessary was to turn on the light to the desired standard strength, and flip the lever that brought the reflecting mirror into place. Then I would simply close down the diaphragm of the camera's lens until the illumination of the image seen on the ground glass matched that of the standard positive. That would be the correct exposure!

When using filters, I could simply put the desired filter in place before the aperture by means of the Mitchell's revolving filter disc. Then, holding an identical filter before my eye, I would adjust the diaphragm again

in the same way, to match the two images.

Crude as it now seems, this meter worked with surprising accuracy. I still remember how my first test of the device surprised me. After having gone to some little trouble to make the device, I felt it ought to work, but I must admit that I had none too much confidence in it. Especially after setting the thing up and making a strictly visual test!

I had chosen a spot in the bright sunlight beside one of the stages at the United Artists Studio; my own judgement of the correct exposure for that shot was, as I remember it, about $f:8$. But when I had matched the densities in my meter, I found I had my lens set at about $f:18$. That couldn't be right!

I was about to pack things up in disgust when my Assistant, who had sweated mightily over getting the thing together and adjusted on my camera, urged that there couldn't be much to lose if we exposed a few feet of tests—and it would be a pity to go to so much trouble with nothing to show for it! So we compromised by shooting some tests of a variety of light-conditions: "hot" front-lights, top-lights, cross-lights, back-lights and even in deep shadows. So assured was I that the readings my meter gave were impossibly wrong that I slated the roll "Do Not Print!"



Some of the tests described by the author. The pictures reproduced above are enlargements from 35mm. negative exposed in 1928. All received identical printing.



SAN JUAN, PUERTO RICO

But when the negative came back from the laboratory, the shoe was distinctly on the other foot; the various takes were so evenly exposed that they could have been printed on a single light! When I recovered from my surprise, I ordered the roll printed, and had the pleasure of seeing that they actually did print all on one light.

Used On "Hell Harbor"

Needless to say, when the "Hell Harbor" troupe went on location, I followed the guidance of my meter religiously. There were plenty of times when I shot at the indicated exposure only with grave misgivings. Several

times I allowed myself the protection of making an extra take, exposed at what I thought was more nearly correct than the meter's reading; but in every instance the meter's indication proved accurate. As a matter of fact, none of my protection takes got into the completed picture!

I found the meter was more than ordinarily helpful in judging filtered exposures, especially when making night-effect shots by day. Back in 1923, of course, there was no such thing as Agfa's present Infra-Red film, which has since made the making of filtered night-effect shots such a routine matter. Instead, there was a

great deal of mystery about making night scenes in the daytime. Not many cinematographers could do it, and when a producer or director learned that you could actually turn day into night, your stock went up considerably. Sometimes your salary did, too.

But if the truth be known, making night scenes by day was almost as much of a mystery to those of us who could do it as it was to the uninitiated. We had to use filters that were visually almost opaque—usually a 70, a 72, or sometimes a 23A-56 combination—and getting the correct exposure was a matter of pure, but by no means simple, guesswork. Sometimes you guessed right; sometimes you didn't.

I found my crude meter a lifesaver in making that sort of night effects. I'd use a print of a night-effect scene in my comparator, and rotate the 70 filter into place in the camera. Then it was simply a matter of giving my eye time enough to adjust itself to the extremely low illumination of both ground glass and comparator: that usually took a moment or so, after which I could use the meter in the usual way.

While we were there in Florida making the picture, our negative was of course going to New York for development; hand-tests showed that our exposures were running quite consistent, and we finally finished our location work and started home content that in spite of the tropical hazards, all our scenes would be comfortably within the allowable 21-light printing range.

But imagine my surprise when I

found that notwithstanding the fact that the picture combined interiors, normal and filtered day exteriors, and a very great number of filtered night exteriors, the entire picture printed on only four printer-lights!

Still Practical

I still have that meter, though I haven't used it for years. But I am convinced it would still work as successfully as ever, in spite of the tremendous advances in film manufacture made since 1928. Of course I designed that meter for the only type of film that was then available—the earliest, slow, high-contrast panchromatic. But using it today for a softer and infinitely faster emulsion like Agfa Supreme would involve only the simple change of setting the comparator light to a lower illumination standard, to match the smaller diaphragm openings that would be used under modern conditions. The same sort of adjustment could be used, as I did at the time, to automatically compensate for the instances in which one prefers to make part of his exposure compensation with the shutter, rather than doing it entirely with the lens.

Today, of course, most of us are using photoelectric meters of one kind or another, and the crude contraption of soldered brass and bakelite that I used eleven years ago is pensioned to secluded retirement in a corner of my workshop. But it was the first exposure meter—and perhaps the only one yet built—that took its reading through the camera's actual optical system, and was a built-in part of the camera.



LORETTA YOUNG

Motion Picture Portrait by Merritt B. Gerstad, A.S.C.

(Reproduced from 11x14 print; insert in corner shows comparative size of one of the 35mm. frames from which enlargement was made.)

Fine-Grain Portrait Stills from 35 mm. Motion Picture Negative

By WILLIAM STULL, A.S.C.

DURING recent years the increasing acceptance of the miniature camera as an aid to studio still work has given rise to considerable discussion of the possibility of utilizing frame enlargements from the actual production negative for some types of publicity and portrait stills. While it is certain that for the bulk of studio still work nothing can take the place of conventional big-camera negatives, the still-men themselves are the first to point out that there are times when

no conventional still camera can capture the precise effect obtained on the screen. In some instances photographic considerations such as differences in lens and emulsion characteristics make this impossible; in other instances it may be physically impractical to attempt the making of conventional stills, even with a miniature camera.

In such instances there would be much to be gained if really satisfactory still enlargements could be

made from production negative frames.

This is by no means as easy as it seems, however, for inherent technical difficulties render it a very different proposition from the familiar matter of making enlargements from minicam negatives.

Grain-size A Problem

One of the chief problems is of course grain-size, which is in turn related to that of negative development. In comparison to the standard negative developers of only a few years ago, the solutions commonly used today in studio and commercial laboratories are rightfully considered as fine-grain developers. But in comparison to the ultra fine-grain solutions universally used for miniature camera negative development, these solutions are admittedly lacking in truly fine-grain characteristics.

In addition, while the old silent-picture aperture is roughly half the size of the usual minicam frame, the present Academy Standard sound picture aperture has an area about one-third less than the silent picture

aperture. Thus if equal-sized enlargements are made from a minicam frame and from a frame of modern studio production negative, the latter will be subjected to somewhat more than double the relative enlargement. An 11x14 inch print from a 35mm. production negative frame will magnify the image—and with it the grain-structure—considerably more than would be the case in a 26x33 inch enlargement from a Leica or Contax negative!

These two factors place serious limitations on the definition obtainable in such cine frame enlargements for regardless of the optical quality of the original image, the coarser grain-structure and the greater relative enlargement will cause an apparent loss of definition.

Further, the 35mm. negative is too small to permit retouching; and where a picture is subjected to the close and detailed inspection usually given a still, some retouching is almost inevitably necessary.

Wanger Experiments

During the making of the recent Walter Wanger production, "Eternal-



Comparison of grain-structure of conventional single-frame enlargement (left) and three-frame enlargement (right) of detail from picture on opposite page. Reproduced actual size from 11x14 inch prints.



SNOWY HIGHWAY

Photographed by E. E. Doughty

ly Yours," Director of Photography Merritt B. Gerstad, A.S.C., filmed a montage sequence which included a series of exceptionally beautiful close-ups of the star, Loretta Young. Some of these shots have been pronounced the finest close-ups ever made of this glamorous star.

Wanger's Director of Publicity is the progressive John LeRoy Johnston, whose advocacy of action and eye-appeal in publicity stills is well known. He seized upon this as an opportunity to experiment with the possibilities of using production negative for special stills. If the experiment succeeded, he reasoned, a very valuable new avenue would be opened for obtaining stills which cannot be obtained by conventional means. Moreover, he would obtain a series of unique portraits of his lovely star.

No stranger to the photographic possibilities of modern minicam technique, Johnston felt certain that with modern sensitive materials and enlarging methods, success was much more likely than at any time in the past. Photographic quality was of course the keynote of the problem: but if some method could be evolved to bring to usefully proportioned

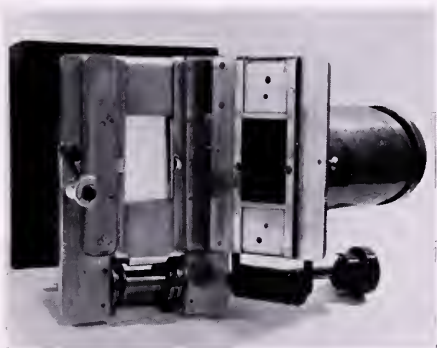
still enlargements the quality Gerstad had put on the screen, the result would be something radically new in portraiture.

Overlapping Grain-Images

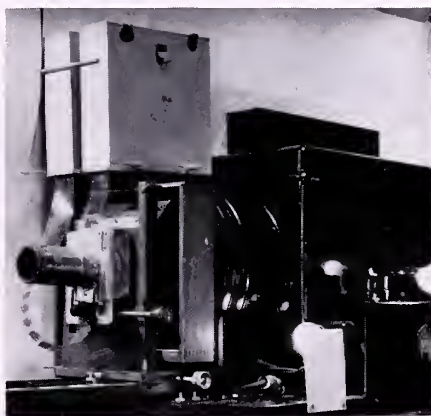
The matter was finally placed in the capable hands of Steve Hansen, photographic technician in the West Coast laboratory of *Look* magazine.

Hansen, when he accepted the assignment, realized that similar experiments had been made before, and that photographic quality and grain size had been the main stumbling-blocks. Still, he reasoned, when the same scenes were projected in a theatre they would be subjected to infinitely higher magnification than any necessary in making still prints. The projection frequency of 24 images per second would tend to make the individual grain-images overlap and blend into each other, minimizing the impression of graininess.

Similar treatment, utilizing not one but several frame images for each print, should produce a similar result in minimizing grain in his enlargements.



Hansen's multi-frame negative carrier, showing sprocket and pilot pins.



Enlarger adapted for multi-frame printing. Note enclosed magazines for protection of film.

Therefore he began by making a special negative-carrier for his enlarger. Equipped with a standard motion picture camera lens—in this case a 2-inch Carl Zeiss "Tessar"—the negative carrier was fitted with a sprocket for moving the film and with a pair of accurate pilot-pins to hold the film in perfect registration. For simplicity of construction, the pilot-pins were manually operated.

Three-Frame Printing

The nature of the scenes was fortunately such that there was very little movement between each frame exposure. Therefore Hansen found it possible to select groups of three frames from each scene for making his prints.

Each print was accordingly a triple-exposure, receiving approximately one-third of the total exposure to each of the three negative frames used. Since the original negative had been photographed with a pilot-pin equipped Mitchell, and the enlarger was fitted with equally accurate registering-pins, the three exposures were in perfect register.

The prints were 11x14 inches in size; the full frame area was by no means always used. The most highly magnified enlargement utilized but half the frame, and gave a 24-diameter magnification which in point of actual enlargement is roughly comparable to a 44x56 inch print from a standard minicam negative!

The negative used was a clip from the actual production negative: it received no special fine-grain treatment, but like all of Wanger's negative went through the usual processing of the Consolidated laboratory. The lighting is of course Gerstad's, and it is to be

observed that he employed a very slight diffusion which in these prints gives a result comparable to that of the diffusion favored by many still portraitists.

The grain-structure, as the illustrations show, is exceptionally fine. When one realizes that these prints are "blow-ups" from 35mm. frames, and is looking for grain, it can be seen: otherwise it would probably pass unnoticed. The general quality is surprisingly well comparable to that of enlargements from standard portrait negatives.

Motion Picture Portraits

Hansen's comments on his achievement are characteristically modest. "I can't claim to have originated the idea," he says, "for I know of several others who have used the same principle in the past. If the results I have obtained are better than those generally had before, I think most of the credit should go to the improvements in sensitive materials and methods. Gerstad gave me a fine negative to work with, made on modern film, and I made my prints on the new Agfa Cykora paper which, almost since its introduction, we've used practically

Three frames of the scene from which the enlargement on the opposite page was made. (Reproduced actual size.)





LORETTA YOUNG

Motion Picture Portrait by Merritt B. Gerstad, A.S.C.

exclusively for our enlargements in *Look's* West Coast laboratory. The matter of film shrinkage gave me some problems to contend with in getting good registration; but for the rest—with a good negative, good

equipment and a really flexible, modern printing material like Cykora. I could hardly go wrong!"

Publicist Johnston considers Hansen's work a distinct achievement. "Up to now," he points out, "35mm.

frame enlargements were only possible at a very evident sacrifice in photographic quality. Hansen's prints, on the other hand, might easily be taken for big-camera portraits. I think these pictures point the way to a new range of possibilities in the publicist's eternal search for life and action in his stills. Of course such pictures as these can never take the place of conventional stills—but in their own field they get a certain realism never possible by any other method.

"Not every type of cinematography is adaptable to this use; we were fortunate that Gerstad gave us a negative of pleasingly crisp definition and lighting. A scene photographed with heavy diffusion or unduly soft lighting would probably not enlarge at all well.

"I'd like to point out one important fact these pictures bring out. The most common objection to miniature camera and 35mm. cine negatives for making high-quality still enlargements has always been the impossibility of retouching these small negatives. And it is a matter of commonly accepted routine that all stills—especially portraits—be retouched before prints can be released for publication.

"These negatives could not be retouched. They were not. But Gerstad's lighting was such that no retouching was necessary!

"This proves another important fact: that even though many of us have for years paid tribute to the artistic skill of our 'ace' Directors of Photography, most of us have over-

looked the fact that they are not only the cine-camera masters of the world, but that their daily achievements rank them among the greatest camera-portrait artists of the world as well.

"We are inclined to overlook this when we see a movie in a theatre or projection-room, for the story properly overshadows the technical contributions. But when you can study a picture like one of these 'Motion Picture Portraits' at leisure, you cannot help realizing that an 'ace' cinematographer like Merritt Gerstad is also an 'ace' portraitist.

"I feel this opens up a new field in portraits of our stars. We talk a great deal about what the beautiful photography of an artist like Merritt Gerstad or Jimmie Howe does to make stars such as Loretta Young or Hedy Lamarr even more glamorous than they really are. Now we can show it in stills!

"In addition, there are some very fine players whose chief charm is in animation; who appear delightfully natural on the screen, but who seem stiff and wooden in stills. Motion picture portraits of such players as these would seem the only possible way of being sure of capturing their real personalities in stills. Speed-flash shots can catch the animated moments, but at a sacrifice of good lighting and portrait quality. These motion picture portraits can condense the best phase of animation into a still, and at the same time maintain the high standards of lighting and photographic quality we demand in modern-day pictures."



370 M.P.H.!

Photographed by Truman D. Vencill

“Covering” John Cobb’s Assault on the World’s Speed Record

By TRUMAN D. VENCILL

Illustrated by the Author

BREAKING the world’s land speed record over the famous Bonneville Salt Flats in Utah furnishes the world’s most gruelling test of car and driver. It also furnishes an equally merciless test of the films and cameras used to make pictures of the event.

As an official Photographer for the Contest Board of the American Automobile Association, I can call on personal experience to verify that last statement. I and my cameras have been on duty to picture all of the record tries since Sir Malcom Campbell and his “Bluebird” first pushed the record above the 300 miles per hour mark. Frankly, I can’t think of any location where climatic and lighting conditions give film a harder

workout. During the daytime, it is incredibly hot; at night it gets almost equally cold; and the change from extreme cold to extreme heat is amazingly sudden.

Most of the runs are made in the early morning or late evening, and the film that pictures those runs has to be right out in the midst of the temperature changes. Often when we get up at dawn, with a run in prospect, the thermometer will be wavering somewhere below the 50° mark; only a short time later, as the sun warms to its day’s work, the mercury will have jumped to better than 110°.

Supreme Stands Up

What this does to film can easily be imagined. During the several years

I've been photographing these record runs. I've tried almost every type of film available—and up to this year, the troubles I've had with reticulation, unnaturally exaggerated graininess and even softened emulsions were heartbreaking.

But this year, for the first time, I took Agfa Supreme to the speed wars: and to my delight I found that Supreme is the first film that stands the test of Bonneville's rigorous temperature-changes. Where past experience with other films had taught me to expect reticulation, abnormal grain and every other imaginable trouble, Supreme took it and liked it to the extent of giving me some of the best pictures I've ever made of a record try.



Sir Malcolm Campbell makes 301 m.p.h.

But perhaps you'd like to hear something about how a person like John Cobb, Capt. Eyston or Malcolm Campbell goes about the business of setting a new land speed record. And "business" is decidedly the word for it: driving one of these wheeled bullets across the salt-beds at 370 miles an hour costs almost as much as an average motion picture production, and involves fully as much careful preparation.

To begin with, you must have a

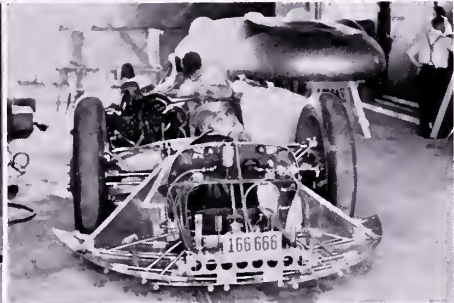
car; and you can't just walk into a salesroom and say "Wrap that one up for me!" On the contrary, you have to seek out one of the very few engineers in the world who can design a six-mile-a-minute speedster, and you design and build your car from scratch. Even the nuts and bolts often have to be built specially for the purpose.

Campbell and Eyston both had huge juggernauts, as powerful as a racing airplane, and bigger and heavier than most trucks. John Cobb and his designer, Reid Railton, pinned their faith to a far lighter and less powerful design, trusting to aerodynamically perfect streamlining to do the work of weight and brute power.

Eleven-Year-Old Engines

One of the most surprising things about Cobb's record-breaking "Red Lion" was the fact that his engines were over eleven years old. The car used two of them—one to drive the front wheels, the other to drive the rear wheels. They had begun their careers as airplane engines, known as the Napier "Lion:" each had twelve cylinders in three banks of four, two arranged in the usual V-formation, with the third standing upright between the other two. Originally, if my memory is correct, these engines produced about 150 hp. each: but today, between modifications and the special racing fuels used, they produce considerably more power.

Over the low-hung chassis of the "Red Lion" is placed the demountable body, which is carefully streamlined not only to minimize air resistance, but to make the air-currents help to hold the car on the ground at high speeds. Following the experience of



Top, left, part of crowd; right, "Red Lion's" instrument-board. Middle, left, "Red Lion" under wraps; right, with body removed to permit motor adjustments. Bottom, left, John Cobb gets into his car for a run; right, refueling for the return run: cans at right contain ice for cooling the motors.

racing aviators, this body has a smooth, highly polished surface, for it has been found that at such high speeds the friction of an unpolished body can create enough resistance to lower the speed several miles per hour.

Once one has a car and, of course, a crew of skilled mechanics to keep it in condition, the next problem is finding a track where the car may safely be "let out." This means a hard, smooth, flat stretch at least a

dozen miles long. It must be free from wind, for a sudden cross-wind can literally blow a car off the track when the car is covering a mile in less than ten seconds!

The Bonneville Salt Flats, near Wendover, Utah, offers what is probably the most nearly ideal speed course in the world, and the Utah authorities have cooperated to make and keep it the world's fastest speedway. The surface is a vast expanse of solidified salt, as flat and smooth as



AAA timer A. C. Pillsbury, Designer Reid Railton, John Cobb and Earl Gilmore discuss speed for the newsreels.

ice. Ordinarily, it is covered by about an inch of powdered, loose salt, much as a frozen lake may be covered with snow in wintertime. But when these speed tests are on, the State Highway Department sweeps the track clear with a special scraper.

Thirteen Miles of Salt

This provides a speedway as hard and smooth as newly-laid concrete, some sixty feet wide by thirteen miles long. Down the exact center of this lane, its position determined by accurate surveying, runs a black line, one foot wide and thirteen miles long. This guides the driver on his course.

Along this thirteen mile strip are accurately laid-out distances of 10 miles, 10 kilometers, 5 miles, 5 kilometers, and the crucial measured mile and measured kilometer across which the record sprint must be made. Photoelectric-eye timing circuits accurately time the car's rush across these distances.

Finally in the course of preparation comes the matter of proper fuel and oil. Up to this year, the British racers brought their own with them, specially compounded by leading British refiners. But this year, for the first time, John Cobb utilized American products. The lubricant was a strictly

stock Gilmore oil; the fuel, while specially compounded for the purpose, was prepared by the Gilmore refineries. In comparison to familiar commercial fuels it was something like Agfa Ultra Speed Pan in comparison to yesterday's slow emulsions; the high-test gas we buy for our cars has an Octane Rating of about 80, and the best military-standard aviation fuel a rating of 100; but this special mixture rates at around 120! Liquid TNT could hardly pack a stronger kick!

It is highly significant that Cobb's car, with scarcely no major modifications since last year's run, but using this more potent fuel, achieved a speed of some 20 m.p.h. faster than its best previous record. A great deal of credit is certainly due E. J. Sanders, the American chemist who compounded the fuel.

Making The Run

When everything is ready, and all are assembled on the salt flats, the racing day begins before dawn. We rise at about 3:30 in the cold gray dawn, gulp a bit of hot breakfast, and tense ourselves for action.

The mechanics take a last look at the vitals of the car, and fill its capacious cooling tanks (which take the



Adjusting the pushing-pole with which "Red Lion" is started.

place of radiators) with cracked ice from big cans. Then the streamlined body is lowered lovingly over the chassis.

A service truck, from the rear of which extends a long springboard, backs up in front of the racer, and Cobb carefully lowers himself from the board into his seat. Then a streamlined housing is dropped, like the cockpit enclosure of a racing plane, over his head.

Since the "Red Lion" has no starters, there seems a common misconception that the car is started by being towed by the service truck. This is not quite true: the truck comes up *behind* the racer's tail, a pushing-pole is inserted in its special socket in the racer's tail, and the truck pushes.

You'd realize why if you once saw one of those racers start! The truck rumbles forward, building up to some 40 or 50 miles per hour. Suddenly comes an explosion, then another, and finally a roar from the racer's engines. There may be a little spurt of smoke from the exhausts—and suddenly the racer is no longer there! Fifty miles an hour is literally a standstill for a car like the "Red Lion"—Cobb doesn't shift into high until he's doing better than 200—and once she starts, she whisks herself out of sight faster than the eye or brain can follow.

Six Miles To Stop

Running to the start of the course, Cobb manipulates his two hand-throttles until the two motors are synchronized; then as he hurtles down the course he opens up—accelerating for six full miles to build up maximum speed for the measured mile.

He comes by the judges' stand with a roar and a streak of polished silver.

And as he flashes past the end of the measured mile, he starts decelerating: from 370 m.p.h. it takes the full six miles left to bring his car to a stop.

At the end of the course, the body is again removed, while tires are changed, fuel, oil and cooling ice replenished, and the car is turned around for a run in the opposite direction. The rules demand that two runs must be made in opposite directions over the same course, within an hour, if the record is to be considered official. Newspaper readers will recall that on his first attempt this year, Cobb stalled his engine on one run, shifting into high at 200 m.p.h., and could not get restarted in time to make his return-run within the specified hour. However, he certainly made up for it a few days later when he officially covered 1 mile at



John Cobb: "How fast did I go?"

368.85 m.p.h., 1 kilometer at exactly 369 m.p.h., and in the process actually exceeded 370 m.p.h.

Even so, the "Red Lion" was apparently far from "wide open," for the roar of the motors told us plainly that Cobb was still accelerating all through the measured mile. Actually tires seem to be the limiting factor. The tires used were built for a speed of 360 m.p.h., and at 370 were being strained perilously close to their limit. With sturdier tires, it seems certain that "Red Lion," with no mechanical changes, could attain 400 m.p.h., or better.

Making The Pictures

Photographing either stills or movies of the actual speed run is complicated by the precautions necessary to assure the safety of both the spectators and the racer himself. Not only the general public (nearly 10,000 people came to watch Cobb's run this year) but photographers, the driver's crew, and even the official timers, must be kept at a respectful distance from the track, so that in case the driver should momentarily lose control of his speeding monster, he would have room enough to maneuver safely.

With a car moving at that speed, if anything happens, it happens fast: a car travelling a mile in ten seconds covers 528 feet in a second! Therefore the authorities insist on keeping clear a 1000-foot lane on either side of the actual track—"just in case!"

This means we photographers must work exclusively with telephoto lenses. In my own case, that meant a 135mm. objective on my Contax—and the

image on the negative was smaller than I wanted, even so.

Minicam Advantages

Using a miniature camera in photographing these speed trials is, I believe, a definite advantage. The telephoto lenses used on a minicam naturally give far more depth than any comparable objectives for bigger cameras. Moreover, with a minicam, much slower shutter speeds are possible, which means you can stop down farther for increased depth, and still "stop" the motion of the speeding car. Even when Cobb's car roared across my picture at better than six miles a minute, I was able to stop the motion in my tele-shots at the relatively slow exposure of 1/500th second.

The speed of Agfa Supreme negative was helpful in the same way, for it, too enabled me to use any necessary shutter speed, and yet stop down for greater focal depth. In more routine pictures made of the various people involved—Cobb, AAA executive A. C. Pillsbury, oil-man Earl Gilmore, Designer Reid Railton, and others—the same factor aided in getting crisp, well-defined pictures.

There is another thing for which I believe the film deserves a world of credit: the way it performed under the abnormally contrasty light-conditions. Out there on the salt flats, the sunlight is intense, and most of the landscape is an expanse of glaring white salt, a perfect set-up for contrasty, "soot-and-whitewash" pictures. In spite of this I found that Supreme, with or without filters, had so much latitude that it gave me genuinely pleasing results—pictures that have a brilliant sparkle without being over-contrasty.



Photographed by Pat Clark

Pictorial Beauty

Pictorial beauty on the screen depends on two factors: the skill of the cinematographer, and the quality of the sensitive material he uses.

Agfa Supreme negative is outstanding in this respect. In addition to astonishing speed, *Agfa Supreme*

offers exceptional fine-grain quality, ideally balanced color-sensitivity, and an improved gradational range that captures all the delicate tonal variations that make a picture beautiful. Made by Agfa-Ansco Corporation in Binghamton, New York.

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Motion Picture **TOPICS**

MARCH-APRIL · 1940



MOTION PICTURE TOPICS

WILLIAM STULL - A. S. C.

EDITOR

Contents

TIMELY TOPICS	2
MAKE-UP FOR AGFA FILM PRODUCTS By MAX FACTOR, JR.	5
PHOTOGRAPHIC SPEED RATINGS . . . <i>Part III</i> By HENRY A. FOWLER and LLOYD E. VARDEN	13
CAMERAS OF YESTERYEAR . . . <i>Part III</i> By W. WALLACE CLENDENIN	20
MAKING MOVIES FOR COLORED AUDIENCES By MACK STENGLER, A.S.C.	28
ABOUT OUR CONTRIBUTORS	32
ON THE FARM . . <i>Photographed by</i> SERGEANT REX SERVOS . . <i>Frontispiece</i>	

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Timely Topics

WITH this issue, AGFA MOTION PICTURE TOPICS commences its fourth year of publication. And on this occasion, we feel it only proper to extend to our ever-widening circle of friends and readers throughout the industry our sincerest appreciation for the support and encouragement they have given our little magazine.

When this magazine was first planned, there were those who wondered if people in this busy industry would take the time to notice — much less read — another technical magazine, and one provided for them freely by a manufacturer of film. But those of us who have shaped and carried on the editorial policies of this journal were confident that, expressing as it does the policies of service and quality that characterize the Agfa-Ansco organization, it would find a welcome. We have been justifiably confident, too, that it could serve its own distinctive purpose, without encroaching on the territories of any existing publications.

Time has justified both of these opinions. At regular intervals we have found it necessary to increase the number of copies printed. Still, almost daily, we here in Hollywood and our associates in New York are approached by people active in the industry with a request that they, too, be allowed to receive the magazine. Other evidence, too, clearly proves the fact that our journal is read and liked by cinematographers, technicians, executives and directors wher-

ever on this continent motion pictures are made. Even, we find, in places and by people we had never known to be cinematically active.

In the same way, the cordiality of our relations with the industry's established technical and trade journals has been gratifying. There have been friendly interchanges of news, pictures, and other favors in a way that could not be possible unless genuinely friendly relations and mutual respect existed.

Therefore we want to open our fourth year with a sincere "thank you" to all our many friends, and with the repeated assurance that we will constantly strive to make this magazine of continued interest and benefit to all who read it.

* * *

WHEN truly great achievements are honored by a sincere and widespread tribute, nothing can be added by any printed comment. This year's Academy Awards are like that, and nothing that we or any other editorial writer might say could add to the fact that in no previous year has the industry paid such spontaneous tribute to really great achievements, nor done so with such complete freedom from political, national or racial prejudice.

But we would like to add our few words of congratulation to the men who received premier honors in our own specialized field of photographic achievement. Competition in the fields of both monochrome and color cinematography this year was unusually

keen, for almost every month was studded with the release of an unusual number of productions that were, so to speak, "photographers' pictures," which gave their directors of photography exceptional opportunities for outstanding camerawork. In such company, it took great achievement to win.

We take pleasure, therefore, in extending to Gregg Toland, A.S.C., our warmest congratulations on capturing the Award for the year's outstanding monochrome cinematography. His achievement is, we believe, unique in that two of his 1939 productions, photographed for different studios, were nominated for the Award balloting—a distinction that seldom if ever before has fallen to a cinematographer. In our opinion, and in that of the majority of cinematographers with whom we have talked, it is almost unfortunate that but one of these films could be singled out to receive the Award, for both were of superlative calibre. In any event, the Award has gone to one whose achievements over a period of years have stamped him, in the general opinion of his fellows, as one of the most progressive of technicians and artists in the camera profession.

We take equal pleasure in extending our congratulations to the three men who shared the Color Award—Ernest Haller, A.S.C., Ray Rennahan, A.S.C., and Wilfrid M. Cline, A.S.C. Not for many years have any cinematographers faced a more difficult assignment than these three had in putting "Gone With The Wind" on the screen. Not only the immense physical and dramatic scope of the production had to be contended with, but the far more difficult task of achiev-

ing perfection in every shot—of living up to the mental images already created in the minds of the millions who read the most widely read book of the decade. It is too easy to make much of the fact that these cinematographers had at their command virtually unlimited time, money and facilities. These tangible assets helped, undoubtedly, but it took cinematographic ability of the highest order to complete the assignment, not merely adequately, but in triumphant, Award-winning style.

In past issues, we have commented that the industry is fortunate in its youth, in that while the industry and its methods have advanced enormously, many of the men who pioneered these advances are still among the active leaders. The Award for outstanding Special Effects work, which went to Fred Sersen and E. H. Hansen for their memorable work in "The Rains Came," is an excellent example of this point, for both men are pioneers in their fields. Sersen is credited with the notable achievement of evolving the old-time "glass shot" into the modern matte shot, and of pioneering many other modern special-process methods, including background projection; Hansen is one of the industry's pioneers in sound recording. Each has enough important pioneering achievements to his credit to build up an ample pile of laurels upon which to rest. But instead, they collaborate on the industry's foremost achievement in special effects technique! The industry may well take pride in the men behind such achievements.

* * *

WHILE we're speaking of the Awards, we can't help mention-

ing a bit of news we recently picked up. That is that the Technical Awards Committee is understood to have put itself on record as recommending that the Award for outstanding special-effects cinematography be removed from the category of the Special Awards, to be given or withheld at the discretion of the Committee, and made a regular Award.

That same thought inspired a comment in these pages two months ago. We tried to point out that modern special-process cinematography has come to contribute so much to the technical, artistic and economic success of virtually every production that it deserves regular, rather than merely optional recognition. We're glad to see we weren't alone in our opinion.

* * *

THE recent announcement of a commercially available process for treating lenses to eliminate surface reflections is one of the most important advances made in many years. Cinematographers who have used the treated lenses tell us the treatment increases effective speed by one full stop, while markedly improving depth and definition.

When coupled with the use of today's modern, high-speed negative emulsions, such as Agfa Supreme, this development bids fair to revolutionize studio cinematography and lighting methods. Certainly it should reduce illumination levels to an extent never before possible.

* * *

WE wonder how many of our readers realize that there are not less than two theatres in the Hollywood-Beverly Hills region which as a

regular policy show 16mm. movies along with their regular 35mm. bills? Some of these films have been commercial or educational subjects made directly in 16mm. Others have been 16mm. reductions of noteworthy foreign-made documentary short-subjects which have never been brought into this country in their original 35mm. form, as they have been deemed more suited to educational than to theatrical release. One theatre, even, has at times utilized a publicity tie-up with an amateur movie magazine and obtained noteworthy 16mm. amateur films as special added attractions.

The point is that with modern 16mm. film and projection, the audience cannot tell the difference between 35mm. and 16mm. on the screen.

There are countless small-town theatres which could be reopened and made profitable if they could utilize the lowered equipment, transportation and operating costs of modern 16mm. Countless other hamlets that now have no theatres could support 16mm.-equipped houses.

Once started, theatrical production direct in 16mm. might logically follow. We'll admit technical considerations until recently have seemed to rule this idea out. But during the last few months we have been privileged to screen several excellent productions photographed directly on Agfa Supreme 16mm. negative film, recorded on modern 16mm. recorders, and processed by truly professional, modern fine-grain machine methods. They proved a revelation in quality. We can recommend them as eye-openers to any of our readers who still look askance at 16mm.



EVENING IN PORT

Photographed by Douglas Rudd

Make-up for Agfa Film Products

By MAX FACTOR, JR.

Max Factor, Inc.

FROM the make-up artist's viewpoint, virtually all of the many successive advances in emulsion-making which have occurred since the first panchromatic film came into use some twelve years ago have affected the film's sensitivity to red. The first panchromatic emulsions, of course revolutionized both photography and make-up in that they could "see" red, to which all previous emulsions had been blind. And each successive film improvement — of whatever manufacture — has gone a step or two farther in that direction.

In some instances, the film might be sensitive to more of the red region of the spectrum (as is the case, for instance, with Agfa's Infra-Red emulsion); in other instances, the change has not been so much in the extent of the film's sensitivity in the red, but in the degree of that sensitivity — that is in plain English, its speed to red light. When the earliest of the superpan-type emulsions were introduced, spectrograms showed that while their average sensitivity did not extend quite so far into the red as that of the types they supplanted, they

were actually some 400 to 500 per cent *faster* to red light than the previous types!

These same changes have been evident to some degree in each new film type introduced by every manufacturer. As a result, the make-up artist has learned that it is absolutely impossible to specify a single make-up for all types of film.

Balance Film and Make-Up

It will be obvious, for instance, that a make-up designed to give a normal rendition of face-tones on an orthochromatic film would not do so if photographed on a panchromatic emulsion. In the same way, the minor but definite differences in color-sensitivity and color-speed between different panchromatic emulsions, not only competitive products but different film-types produced by the same manufacturer, will call for minor modifications in make-up. This has been particularly noticeable during the last two years, for all of the present-day superspeed film-types of the class pioneered by Agfa Supreme have been characterized — regardless of manufacture — by increased red speed.

Fortunately, however, make-up technique has been ready to make accurate compensation for such changes. The introduction of panchromatic film gave us a chance to replace the somewhat haphazard make-up methods and materials which had previously existed with scientifically standardized products and methods. The modern panchromatic make-up materials are an accurately-graded range of deepening shades of a reddish-brown — fairly close to the basic flesh tone, but with a sufficient brownish increment to pro-

vide the desired neutral base. Each shade is numbered, with the higher numbers in every case indicating darker shades.

Most recently, an entirely new product, known as the "pancake," has replaced the old grease-paint make-up base. This is, by the way, the only cosmetic which the United States Patent Office has deemed sufficiently unique to be patentable. As its name implies, it comes in cake form; actually it is a compressed powder made to a special formula.

And the "pancake" has revolutionized the application and use of make-up no less than Agfa's fast films revolutionized photography. In all earlier make-up methods, two products were necessary for a finished make-up: a foundation or base (usually a grease-paint); and a matched powder to provide the finished smooth face-texture. The "pancake" supplants both of these; it functions as both foundation and powder at once. In some instances after the make-up has been worn for some hours, and a sheen develops, it may be retouched with powder. Aside from this, no powder is necessary.

Simple Application

The "pancake" greatly simplifies the application of a good make-up. It is very easily applied with a moist sponge, and it is very nearly impossible to get too much on; the consistency of the "pancake" is such that it lends itself naturally to the thin, smooth application that makes the most photogenic make-up. After the "pancake" foundation is applied, the make-up is completed by applying the desired eye-shadow and lip-rouge. The latter is best painted



Make-up Tests, Photographed on Agfa Supreme Negative

on with a brush, by the way, instead of being applied directly in the manner most women apply lipstick.

Since the "pancake" type of make-up is now standard, the series of tests recently undertaken by experts from Max Factor, Inc., the Agfa Raw Film Corporation and the Agfa-Ansco Division of the General Aniline and Film Corporation were all made using this product. In view of the fact that an increasing number of portrait and commercial still photographers today are expressing an interest in make-up, not only Agfa-Ansco's two 35mm. motion picture emulsions — Agfa Supreme and Agfa Ultra Speed Pan — were used, but also a group of the Agfa cut film products, including Agfa Superpan Portrait, Agfa Isopan, Agfa SSS Pan and Agfa Superpan Press. The negatives were developed in the recommended Agfa developers, and the prints made on Agfa Cykon and Cykora papers.

Make-Up for Agfa 35mm. Films

Three make-ups were tested. The first, identified in the test exposures by the letter "B," was an approximation

of what, from the study of spectroscopic cures, we felt should be correct for these films. It consisted of the No. 6-N "pancake" foundation, with the "Deep Red" lip rouge, and gray eye-shadow.

The second make-up, evolved after viewing the first tests, consisted of the No. 7-N "pancake" foundation, the No. 40 Dark lip rouge, and gray eye-shadow. This was identified in the tests as "C."

The third make-up was identical with this "C" make-up, except that a No. 390-A Dark lip rouge was used. It was identified as make-up "D."

From these tests, definite recommendations as to the best make-up for the various film types involved have been developed. However, since individual opinions as to what constitutes a normal rendition of facial tones can and does differ in some instances, we print all of the final tests, so that readers may reach their own conclusions.

The tests made on Agfa Supreme were exposed in a Contax camera, and as in all the tests, the exposure was determined with a Weston photoelec-



Make-up Tests, Photographed on Agfa Ultra Speed Pan

tric exposure-meter. The highlight-side reading was 40; the shadow-side, 25; and the overall reading, 32. This lighting was maintained throughout all the tests. The exposure was calculated using the recommended Weston speed-rating of 32, and was $1/50$ th second at $f:5$.

The tests on Agfa Ultra Speed Pan were exposed in the same way, but with a Leica camera. Using a speed rating of Weston 64, the exposure given was $1/20$ th second at $f:11$. In both instances, these 35mm. negatives were developed in Agfa 17 fine-grain developer, as recommended by the Agfa-Ansco engineers.

From these tests, our own recommendations — particularly for Agfa Supreme — would be to use the No. 6-N “pancake” foundation, with the Deep Red lip rouge used in test “B,” and gray eye-shadow. This is shown in test “B.” It is possible that the taste of some individuals might favor a slightly darker lip-tone rendition than this test; in that case, a darker lip-rouge, like the No. 40-Dark used in test “C” might be tried; however, it should be remembered that both this

test and test “D” used a darker shade of foundation make-up than test “B,” and the contrast between the darker lip-rouge and the light foundation would be increased.

Superpan Portrait and Isopan

The tests made on the various Agfa cut-film products were developed in Agfa developer No. 47 — the recommended solution for these films. It may therefore be pointed out that such portrait workers as may process their negatives in the softer-working fine-grain formulae such as Agfa 17 will do well to modify the following make-up recommendations, especially as regards lip-rouge, since the fine-grain developers tend to work to softer contrasts than the commercial solution used. To obtain a parallel effect using these solutions, a somewhat darker lip-rouge would be advisable.

The tests on Isopan showed that the most pleasing results were secured using the same make-up as recommended for the 35mm. motion picture emulsions, that is, the No. 6-N “pancake” foundation, with the Deep Red lip-rouge and gray eye-shadow, as shown



Make-up Tests. Photographed on Agfa Isopan

in make-up "B."

Superpan Portrait, on the other hand, appeared to give the most pleasing results with a combination of the "B" and "C" make-ups, consisting of the No. 6-N "pancake" foundation and the No. 40 Dark lip-rouge, with of course the gray eye-shadow used throughout the series.

These two tests were exposed under the same photographic conditions as applied throughout, using a Weston speed of 24 for the Superpan Portrait film, with an exposure of $1/5$ th second at $f:14$, and a factor of 32 for the Isopan, giving an exposure of $1/5$ th second at $f:16$.

SSS Pan and Superpan Press

The same recommendations as given for Superpan Portrait appear to apply equally to the other two emulsions

tested — Agfa SSS Pan and Superpan Press. The former was exposed with a Weston speed factor of 64, giving an exposure of $1/5$ th second at $f:32$, and the latter, using a Weston rating of 80, received an exposure of $1/5$ th second at $f:40$.

From the "C" test on SSS Pan, reproduced herewith, it will be seen that the No. 40 Dark lip-rouge gave a very natural effect, but that the No. 7-N foundation used seems the merest shade dark for the most pleasing results. Therefore the suggestion is to use the No. 6-N "pancake" foundation, which is a trifle lighter than the 7-N shown in test "C." and the No. 40-Dark lip-rouge, which was satisfactory.

This comparison is borne out equally well in the two Superpan Press exposures reproduced. It will



Above, Agfa Superpan Portrait; Below, Agfa SSS Pan





Make-up Tests. Photographed on Agfa Superpan Press

be seen that the skin-tone in the "B" test, which used the 6-N "pancake" foundation was excellent, but that the lip-tone given by the Deep Red lip-rouge was rendered rather too light. The "C" test, on the other hand, shows that while the 7-N foundation used seems a trifle dark, the lip-tone produced by the No. 40-dark lip-rouge was most pleasing. Therefore the recommendation is a combination of these two make-ups: the 6-N "pancake" foundation and the No. 40-Dark lip-rouge, with the gray eye-shadow.

In conclusion, it should again be pointed out that individual variations in laboratory processing methods may produce some variation from the results here described: in some laboratories, negative development and printing may combine to give a some-

what flatter result than obtained in these tests, while in others, the same factors may give a higher contrast. In such instances, however, we believe that a slight change in the shade of lip-rouge employed should be all that is necessary for compensation; where soft processing is used, a darker lip-rouge will restore the desired balance, while where the processing inclines to higher contrast, a lighter shade of lip-rouge should suffice.

It may also be mentioned that while the tests reproduced show only a blonde subject, the preliminary tests were made with both blondes and brunettes. However, so little difference in make-up was evidenced that it was decided identical make-ups would, with these films, be equally satisfactory for both blonde and brunette.

Photographic Speed Ratings⁺

By HENRY A. FOWLER AND LLOYD E. VARDEN

Agfa-Ansco Corporation, Binghamton, N. Y.

PART III

Practical Limitations of Speed Ratings

Aside from the difficulties in the measurement of film speeds and the perfection of a system of speed numbers, the practical application of even a so-called "perfect" rating system would be limited by several consequential factors. No system of speed rating can possibly be expected to account for personal preferences in judging negatives, to allow for personal errors in the use of exposure meters, to take into consideration mechanical variations in exposure meters and camera shutters, to allow for peculiarities of divers lenses, or to be in accord with any of several other possible causes of exposure error. If such errors are accumulative it is highly probable that they can cause deviations as great as 300 to 400 per cent from the calculated exposure. A great many of these are shown in the accompanying chart. Fig. 18.

Personal Factors

No factors in determining exposure properly are so difficult to systematize as personal ones. However, it should not be thought that this is the result of individual stubbornness, for (if we may be philosophic) "the truth may

be spoken without the fact." Should one person be able to perceive the number 14 when making a reading with an extinction type exposure meter, it does not violate a lower reading, say 12, of another person. To both these individuals, the truthful reading is what they perceive, and since the readings are based on visual interpretation, *fact*, as such, does not exist.

Personal factors such as the preference for either thin or dense negatives are just as difficult to rationalize, and so we can never hope to discover a system of rating film speeds which will not require some individual adjustments to account for these personal idiosyncrasies.

In addition to these strictly personal factors, there are other considerations which may be classified under this same heading, although they apply to all individuals to a greater or lesser degree. In judging light intensities, it is often thought that experience enables one to become quite expert. On the contrary, dependence on judgment in this instance is a most efficient method of experiencing considerable difficulty. The human eye is a marvelous mechanism and a part of its function is to adapt the individual to a wide range of illumination levels.

The iris and retina of the eye function to make it more or less sensi-

⁺(Reprinted through courtesy of the 1940 *American Annual of Photography*)

tive at various levels of illumination and their reactions are entirely involuntary. For this reason it is not very probable that one can become expert in "judging" light. It is also for similar reasons that many extinction type meter readings may prove erroneous. (For an excellent discussion of the visual mechanism read Chapter XII, "The Scientific Basis of Illuminating Engineering," by Parry Moon).

Mechanical and Physical Factors

We have already hinted that variations in camera shutters, lenses, and exposure meters may be of considerable importance in obtaining good exposure. These variables usually are given only a minimum of thought, whereas less important factors are blamed excessively for exposure difficulties. To begin with, camera shutters may be simple rotary types, leaf types, or focal-plane types, all of which differ in efficiency. Furthermore, any two shutters of a given type but of different design may vary considerably in efficiency. Leaf shutters, for example, decrease in efficiency as the number of leaves increases. The efficiency varies also for different exposure times, being as low as 40 per cent in some cases of very short exposure and close to 100 per cent for exposures around 1 second (22). A great amount of argument has been set out in favor of focal-plane shutters because of their greater efficiency, but unless a focal-plane shutter is well designed it may be inferior to a good leaf shutter. L. P. Clerc, at the conclusion of a discussion on shutter efficiency, says: "It must be therefore concluded that except for special work or for focal-plane shutters which are ideally mounted, the good modern diaphragm

shutters are, on the whole, distinctly superior to focal-plane shutters."

The rated speeds on most shutters are seldom found to be true. A number of methods have been proposed for testing shutter speeds, several of which are simple enough to permit one to keep a constant check on his particular equipment. Unless this is done, though, there is always the danger of some error in exposure being introduced.

Lenses may also cause errors to arise as great as those introduced by shutter inaccuracies. The reason, of course, is the fact that no substance is completely transparent, and the loss of light by absorption, and in the case of lenses by reflection also, naturally varies according to the quality of the glass, the thickness, and the number of reflecting surfaces (23).

Lens errors of this sort are more or less inherent. Still other errors can be introduced by carelessly setting the diaphragm at the desired f : value or by not taking into consideration the change in effective f : value when making close-range exposures where the bellows extension is increased beyond normal.

Exposure meters, although primarily intended to put aside all difficulties in obtaining perfect exposures, are themselves, in many cases, potential trouble-makers. This statement is not made intending to discourage the use of exposure meters—far from that. An exposure meter, especially one of the newer photoelectric types, is universally recognized as a distinct part of one's photographic equipment. But!—an exposure meter is a mechanical instrument, and not a Sun God. It cannot be revered and blindly de-

fended as some mystic idol. Seldom do two exposure meters give the same reading under the same conditions of light; but the error in this instance, except in rare cases, is less than the variance possible by differences in manner of using the meters. Some photoelectric type meters become less sensitive with continued use. Others may be affected by heat and moisture. However, these sources of error can be controlled by care of the meter and by periodic checking. Or better still, instead of using the meter as an absolute instrument, it should be used as a guide in judging exposure, which judgment may be tempered by experience. A meter which consistently indicates exposures which result in negatives of too high density or too low density does not have to be discarded, but rather, the values it indicates simply have to be modified by a factor which experience will dictate.

Processing Factors

In the discussion concerning the factors which influence the character of the H. and D. curve it was pointed out that a great many of them center about the developing procedure. The ideal conditions which are met in laboratories (conditions which are rigorously controlled when speed ratings are determined) are seldom possible to duplicate in practice. Temperature control of processing solutions requires elaborate equipment installations, costing far more than the average photographer can hope to pay. The best solution to this problem is, perhaps, the constant use of a thermometer and simple methods of temperature control, such as a water-bath. However, in many cases these things are even avoided because of the

extra trouble involved. Still other laboratory methods are not adopted in practice, for example, the use of a fresh developer for each development. For economic reasons, it can hardly be expected that this practice will be adopted; therefore, the deterioration of a developer with use, and the accumulation of development by-products certainly introduce serious obstacles to the use of fixed speed numbers. As we have previously pointed out, film speed is lost with increases of soluble bromide, and since free bromides are released during development, little can be hoped for if a developer is used over too long a period and no adjustments for changes in film speed are made. The latter would be indeed difficult to do, anyway, since the amount of bromide which accumulates not only depends on the amount of film development, but also depends upon the exposure level and degree of development. Furthermore, with some developers of low reduction potential (usually fine-grain type developers) the effect of bromide is so much greater than with developers of high reduction potential that no fixed rule on this point can be set down.

The progress of development, it has been shown, is greatly affected by agitation, and so it is highly recommended that a standard method of agitation be worked out and adhered to.

Inherent Film Factors

Most of the inherent film factors of importance in speed determination have been discussed. Some minor considerations—latent image decay, slight variations in emulsions in manufacture, and variations from age—are

not of importance except in a few cases. Practically all commercially available emulsions can be made with properties of high constancy, but in a few rare cases variations may occur. Intentional emulsion changes are carefully called to the attention of consumers by manufacturers if the changes are of a nature which cause inferior results when not regarded in use. It is a common practice of at least one manufacturer to notify the trade of changes by the use of stickers placed on the film container.

Most manufacturers recommend that development be conducted as soon after exposure as possible, but it is not exceptional for excellent results to be obtained on negatives developed several months after exposure. On the other hand, emulsions have been known to lose 50 per cent of their latent image within a few days, and so it is best as a general rule to develop negatives as shortly after exposure as possible.

Purpose Factors

The relation of the speed rating of a film to the use for which the film is intended is a consideration not often sensed by the man in practice. A certain manufacturer received a number of letters asking why a well-known emulsion in cut film form was rated by the manufacturer one-half stop slower than the same emulsion on roll film. The answer, of course, becomes obvious when it is recalled that amateur negatives are for the most part better suited for the purpose when less dense than negatives usually desired by the professional photographer. Negatives to be used for contact printing are often denser than those intended for projection print-

ing. Portrait negatives in the majority of cases are less dense and softer in contrast than commercial type negatives. In some special cases, such as negatives of black-and-white-line originals, exposures are made for the highest densities, whereas in ordinary negative-making of continuous tone subjects, much lower density levels are used. Many other instances could be given where the exposure given a film depends greatly upon the purpose for which the negative is being made. For a system of speed numbers to be valid for all negative purposes is not comprehensible.

Illumination Factors

Every photographer well knows that a flatly lighted subject allows much more variation in exposure than a subject with contrasty lighting. Although recently disputed by a popular photographic writer, it is a good practice in nearly all cases to expose for the deepest shadows in which detail is desired. When the subject is strongly lighted, this means that the exposure required to obtain shadow detail will place the highlights very high on the *D-Log E* curve. If the highlight densities are too high, they become "blocked-up" and cannot be printed: therefore exposure in such cases is very critical. Contrasty lightings also produce negatives of such high contrast, if developed normally, that no paper is soft enough to allow the making of good prints. This is often overcome by a lower degree of development, which in turn decreases film speed and necessitates longer negative exposure than conditions might indicate.

The character of the light source has been considered in reference to its



CURVES AND ANGLES

Photographed by Douglas Rudd

influence on film speed. However, it should be stressed that when filters are used, the *effective* character of the light source is changed. The increase in exposure required by the use of a filter with a given film changes radically with the type of light source also. Such expressions as "a two-times filter" have no meaning whatsoever. An adjustment not only is required in exposure with the use of filters, but in some cases contrast is affected greatly enough to require changes from the normal developing time, which, as we have just noted, may have a considerable effect upon film speed.

Under standard conditions of lighting, exposure will be greatly influenced by the character of the subject. Some materials reflect light very highly, whereas others reflect light to a much less degree. The practice based on determining exposure by the strength of the incident light source is consequently fallacious. The intensity of the light incident upon the film is the light which determines the value of the exposure time. Therefore, every consideration should be made to approximate this intensity as closely as possible.

Colored objects, besides differing in reflectivity and brilliance contrast, also vary in color contrast. Under usual circumstances this is not of major importance provided some attention has been given to the photicity response of the emulsion. In some cases, however, when the subject being photographed is predominantly a particular color, this effect may alter exposure from that required for a subject containing a wide color distribution with no predominant hue.

In the foregoing survey, the authors have attempted to make clear that speed numbers, especially as they exist today, are of very limited value. From the many factors upon which the behavior of film emulsions in exposure and development depend, it is quite obvious that the final result obtained on any particular material is considerably dependent on the manner in which it is used. This should not lead one to believe that correct exposure is not important. Correct exposure is exceedingly important, but to obtain it is not nearly so dependent upon the knowledge of *absolute* speed values as one might be led to believe. As we have shown, no criterion of a correctly exposed negative has ever been arrived at, and so for one to speak of *the* correct exposure is to speak of something which does not exist. With the wide latitude possessed by photographic materials today, variations in exposure within such wide limits as 3 to 1 give negatives which are hardly distinguishable from each other. If it were not for this fact, "exposure" in practice would be an extremely difficult matter, since the errors introduced by the combined factors which we have presented are of a greater order than 3 to 1. For one to know the speed of a film as a rough approximation is sufficient; for surely, considering the fact that differences in subject and in lighting on any one day may necessitate a range of exposure of several thousand times to one, it is evident that the advantage of knowing the absolute speed value of a film for use in estimating proper exposure is insignificant.

The authors wish to acknowledge the extensive use of the literature

from which they have drawn freely, and in many cases without credit. So much of the literature covered, however, was found to be repetitious that proper credit in many cases was difficult to ascribe. This will explain any verbatim phrases taken from previously published articles, apparently unjustly, but we hope not too many have managed to creep in.

Since the preparation of this survey, the Kodak Research Laboratories has further developed the Minimum Useful Gradient Method as a criterion for speed determination by advocating a gradient value based on statistical findings. By making a series of camera exposures to a standardized subject (an illuminated transparency of a typical outdoor subject giving a brightness range of 1 to 30 *on the ground glass*) through a range from definite underexposure to definite overexposure and then printing the negatives *for best results*, a correlation between exposure and print quality was obtained through statistical methods. In this manner it was possible to establish that a minimum exposure value always exists beyond which a further increase of exposure gives no improvement in print quality. It was then found that this value corresponded to an exposure value determined by a point on the *D-Log E* curve where the gradient is .3 the average gradient over a *log* exposure range of 1.5, or a brightness range of 1 to 30. A practical graphic method has been outlined for determining the prescribed gradient from which a speed number is calculated as the reciprocal of the corresponding exposure value expressed in meter-candle-seconds.

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Cameras of Yesteryear

By W. WALLACE CLENDENIN

PART III

Camereclair

Although as has been seen, many of the early-day producing organizations made their own cameras, very few do today. Almost the only exception is the Eclair Film Company, of Paris, which since 1907 has built cameras for use in the Eclair studios and, during the last two decades, for the general market, as well.

The original Eclairs were built solely for use in the firm's own studios, however, and were introduced in this country some twenty-eight years ago when Eclair established its first American studio. When the war began in 1914, Eclair had two studios in this country, one in the east, and one in Arizona. Because of the war, these studios were closed, and the cameras sold to various buyers; most of them went to the World Film Co. of Fort Lee, N.J. for some reason now obscure, these cameras were usually called "Gillons" by American cinematographers.

The old Camereclair was small and compact. The outside dimensions were 6 x 6 x 13½ inches. The 400-foot magazines were mounted side by side in the rear of the box, with a metal partition separating them. This partition ran all the way to the gate panel, the gate was toward the left side of the camera, instead of being centrally located.

Three small sprockets were used: one to feed the film from the unex-

posed magazine up to a second sprocket above the gate, with the third placed below the gate. An opening was left at the top of the central partition to permit the film to pass over to the left side of the camera.

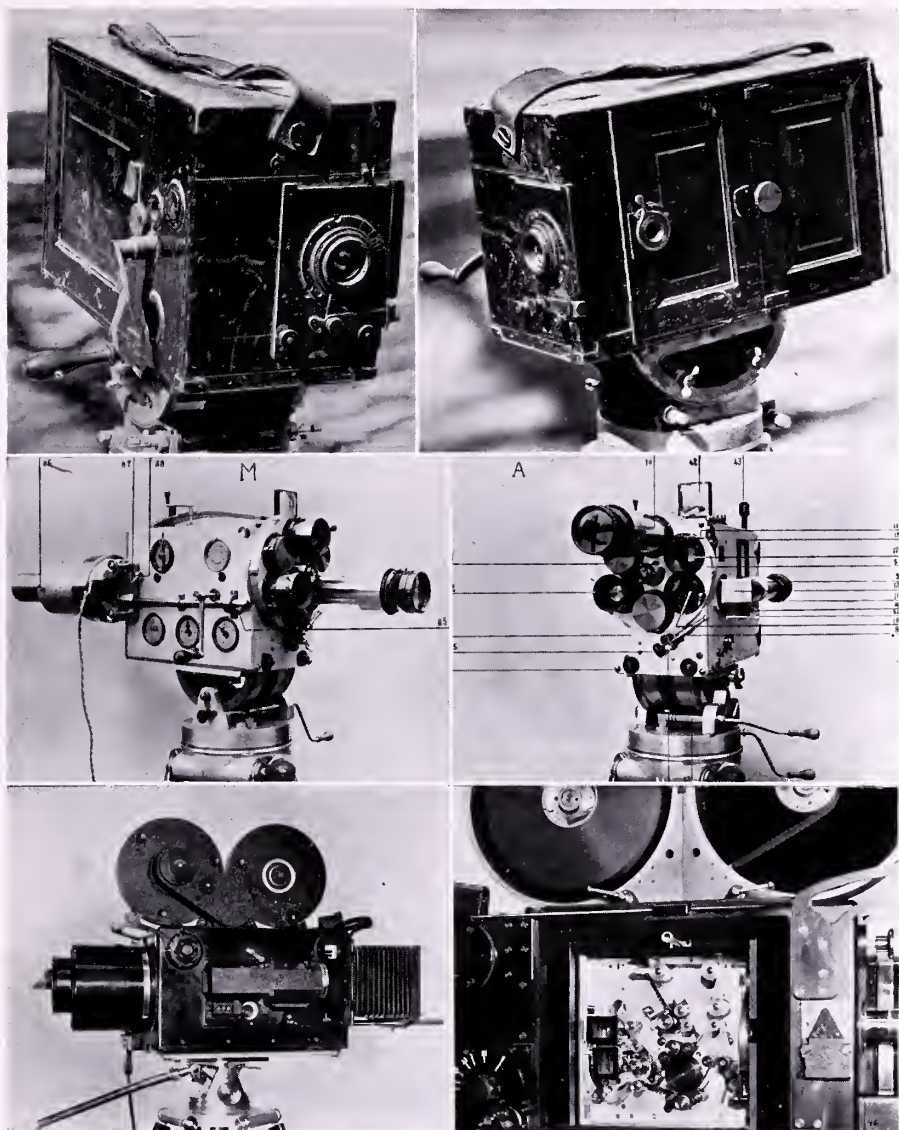
The intermittent was a modification of the Lumiere-Pathe, retaining the essential features, but of somewhat lighter construction. An unusual feature was the lens panel, which could be adjusted vertically, like the rising and falling front commonly used in still cameras. A reflex mirror back of the aperture was provided for focusing.

Later Eclairs

In the post-war years, the Camereclair underwent many changes and refinements, including semi-silencing to meet the demands of the first talkies, but it remained still closely related mechanically to the earlier models.

Perhaps the most unique feature of these post-war Eclairs was the Mery focusing system, which was different from the methods used in any other camera, and combined many desirable features. It is well known that many European cinematographers favor the idea of not only focusing through the the film itself, but even "following" the action through the film as the scene is being photographed. On the other hand, focusing the image on a ground-glass focusing screen is easier, and usually more accurate.

The Mery system provided for both



Top, Early Eclair ("Gillon"); Center, 1929 Eclair; Bottom, present-day Eclair Silent Studio Camera.

methods. A reflex mirror behind the aperture reflected the image on the film out through the case and, through a supplementary reflecting and magnifying system, to an eyepiece at the rear of the camera.

In addition, by a pull of a lever, the film-carrying aperture could be

slid downward and replaced by an aperture carrying a conventional ground glass, upon which the image could be focused in the usual way, with the lens still in taking position.

In the 1929 Eclair this was carried still farther. A six-lens turret was provided, and placed so that the lens

directly above the photographing position was correctly aligned with the movable, upper ground-glass aperture. Thus where focus, rather than precise composition, was wanted, one could slide the focusing magnifier upward to where it reflected the image on this ground glass, and focus from there. In addition, the camera's six-lens turret could be fitted with three pairs of matched lenses, while the upper aperture was adjustable from the outside to correct for vertical parallax. Thus equipped, the action could be followed through the upper lens while it was being photographed through the matched lower lens, in much the fashion of the American Akeley. The upper aperture was above the shutter's disc, so the image did not flicker when the camera was in operation.

Present Camerclair

The present-day Camerclair has been completely redesigned, and has little in common with old one except the name. It is self-blimped and genuinely silent, built from the start for use as a studio sound camera. According to whether you compare it with the old, silent-picture cameras or the present talking picture camera-and-blimp combinations, it may be regarded either as one of the heaviest or one of the lightest types ever built. Its weight—roughly 140 pounds—is vastly more than that of the average silent-picture camera, but just as considerably less than that of the bulky camera-and-blimp combinations with which we are familiar.

The intermittent of the new Eclair is a single claw, working in conjunction with a single pilot-pin and an intermittent pressure-pad. The designer's preference for this type of move-

ment is based on tests which showed that under many conditions the film might actually be moved and registered by but a single claw and pilot-pin, even though two were actually provided: accordingly the single-claw movement seemed simpler and more accurate.

Focusing is by a modernization of the Mery system. A reflex focusing magnifier is provided on the left side of the camera. This may be used in the fashion dear to European cinematographers, to focus or follow action during filming directly on the film: an automatic shutter is fitted to the eyepiece of the magnifier, to prevent fogging the film through this optical system.

For more normal focusing, operation of a control on the outside of the camera rotates aperture, film and reflecting prism 90° back and downward, and slides a second aperture, fitted with its own ground glass and mirror, into place. It is not necessary to open the camera at any time during this operation; and the image is not reversed from right to left as was the case in so many other older reflex focusing methods. The focusing knob is on the right side of the box, and three separate focusing scales are provided in different positions on the outside of the case.

The finder is located outside the camera on the right. Here again reflex prisms are used, this time to permit placing the finder lens as close as possible to the objective. In this way parallax is reduced to a minimum.

The camera no longer has a revolving lens turret, but is fitted with highly ingenious quick-change lens-mounts. The mounts themselves provide compensation for differences in

focal length and stop-calibrations between virtually all normal lenses. Thus a single focusing scale and a single set of diaphragm calibrations will take care of all lenses, regardless of focal length or speed.

The construction of the present Eclair strikes a new note, even as the first metal-bodied Bell & Howells did in the days of wooden cameras thirty years ago. The main frame of the camera is a solid metal plate: the outer casing is moulded of a tough, semi-resilient synthetic plastic which gives strength without brittleness or weight. This casing is lined with sound-absorbing materials, and combines the functions of camera case and blimp in one unit. It is only necessary to open one door to gain access to the camera movement. To ensure soundproof operation, there is a front door, fitted with a window of optically flat glass, in front of the lens.

The magazines are mounted outside the camera, on top. Contrary to usual practice, they are built as single units; in this respect they are like those used on many earlier cameras, but they offer economy and compactness which should be definitely advantageous. Takeup is by an enclosed train of silent gears; the whole take-up drive assembly may be quickly swung from the rear magazine to the front one if for any reason it is desired to operate the camera in reverse.

At present, two of these cameras are in this country. At the end of August, it was intended to supply complete sales and service facilities for the Camereclair in Hollywood, but the outbreak of the war has temporarily blocked this.

Bell and Howell

THE first Bell and Howell camera was turned out in Chicago late in 1907; the designers were Donald J. Bell and Albert S. Howell. The camera was a black leather covered box, of 200 foot capacity, with the magazines one above the other in the rear. There was no apparent attempt to save space in the designing of the camera; it was at least an inch wider than other similar types. Two lenses were used, one for taking and one for viewing; focus was by means of a reflex mirror back of the gate. The viewing, or finder lens was mounted directly above the other one, and projected its image on a large ground glass on the right side of the box. There is no reliable information available as to the design of the intermittent, and apparently no feature of the camera was patented. It is not certain how many of these cameras were built, but the number was somewhere under twenty, and most of these were sold to the Essanay Co., of Chicago.

The first of the famous Bell and Howell standard cameras was built late in 1909, and sold immediately to the Essanay Co. It was a radical departure from conventional design, and was probably the first motion picture camera to be designed as such from the ground up. Every vestige of waste space was eliminated, the camera body being a metal casting which was moulded to fit closely around the mechanism at every possible point.

Of the camera's many novel features, four were outstanding: the method of focusing, the dissolving shutter, the double magazines, and the design of the intermittent.

The Bell and Howell had a revol-



Early Box-type Bell and Howell (1907)

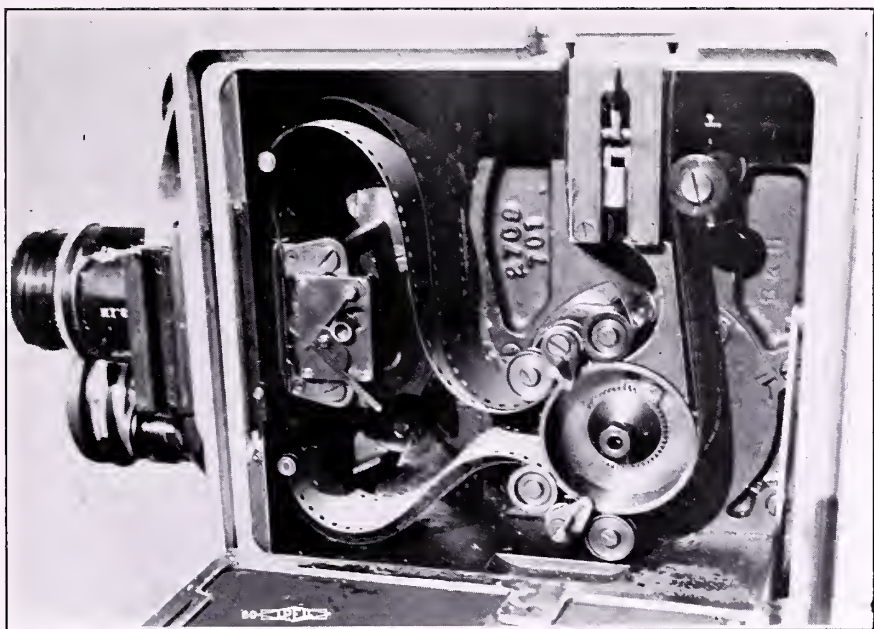
ing turret carrying four lenses — in early practice, two matched pairs of different focal lengths. The lenses of each pair were arranged opposite each other across the turret, so that while one lens was being used for taking, the other might be used as a finder. Since the ground glass of the finder was in exactly the same focal plane as the film, a lens focused on the finder could then be swung over and used for taking. The problem of parallax was overcome by having the whole camera slide over on the tripod head so that the finder lens would be in the same position it would later occupy when the picture was being shot. Once focused at the finder, the lens was then swung over, the camera slid back to its normal position, and everything was set.

The dissolving shutter may not have been the first ever used, but it was probably the first actually to reach the market. Certainly it made the industry sit up and take notice. The only camera prior to the Bell and Howell with an automatic dissolve was the Pathe Professional, with its

lens diaphragm coupled to the mechanism. A lens dissolve had two disadvantages, one of which was the visibly increased depth of focus as the lens was closed.

The other bad feature was that a lens fadeout never — as a rule — was quite complete, especially when shooting in strong sunlight. Some cinematographers resorted to speeding up on the crank at the end of a dissolve to further cut the exposure; this caused a slowing down of the action which was sometimes quite effective, in other cases merely comic. Another device was the insertion of a special diaphragm blade which had a small projection which would completely close the lens at the smallest aperture; this was fairly satisfactory.

In passing it might be remarked that the first shutter dissolves used with artificial lighting caused plenty of headaches. In those days alternating current was used for lighting the sets, and the shutter aperture as it was cut down used to get in step with the 60 cycle current. The result was not a smooth fadeout, but a



Movement of Standard Bell and Howell

series of wild blinks that looked as if someone were fluttering something back and forth across the lens.

The Bell and Howell double magazines were at first unpopular because of the extra space they took up, but it was soon realized that they saved a lot of time. Instead of having to shoot until the end ran through the camera — perhaps in the middle of a good take — or instead of having to open the almost empty magazine and throw out a good short end, it was now possible to stop and change magazines at any time without having to cut or rewind the film.

The Bell and Howell intermittent was probably the most radical departure of all from standard design. Other cameras had the film running in a straight line through the gate, with the claws moving in and out of the perforations. The Bell and Howell claws moved straight up and down, the

film was shifted backward and forward.

Moved to the rear it was impaled on the claws which pulled it down. At the bottom of the stroke the film was moved forward off the claws, up against the aperture plate, and onto a pair of pilot pins which held it during the exposure. The only time any pressure was exerted on the film was while it was standing still, the rest of the time it was absolutely free from drag of any kind. Even the light traps of the magazines exerted no pressure on the film, since these were opened automatically by the closing of the camera door.

Although the first Bell and Howell standard model was sold in 1909, it took the industry eleven years to get around to recognizing it as the best American apparatus then available. The first camera sold to Essanay was followed by others; Essanay seems to

have been a proving ground for many Bell and Howell "firsts." Selig — who ordinarily used their own cameras — bought one or two Bell and Howells, and sent out what was probably the first standard model to reach the Los Angeles area; this was about 1912.

When Thomas H. Ince became one of the important figures of the industry with his studio at Santa Monica, he threw out all the older cameras he had been using, and went over entirely to Bell and Howells. The American Film Co. of Santa Barbara followed suit, and the rush was on.

1920 saw the studios almost 100% Bell and Howell equipped; in that year the company sold 142 cameras. As an interesting contrast it might be noted that in 1913, after the camera had been on the market three years, just twelve cameras were sold, an average of one a month.

Those who believe that 1000 foot magazines were not used until sound came in, may be surprised to learn that the first ones were turned out by Bell and Howell in 1916. They were used on Jackson J. Rose's camera, and if you haven't already guessed it, the studio was Essanay. The first Bell and Howell motor drive came out in 1918.

The present Bell and Howell standard model is substantially the same in its general design as the first one of 1909. That one was so carefully and accurately designed, that no major change has ever been found necessary, and such modifications as have been made since that time have been merely that addition of various accessories. Among the more important of these modifications is one which simplified throwing the camera-head over to focusing position. In current models, the original dovetailed slide has been replaced by a lever operated mechanism in which the rear part of the camera-head — from the shutter back — moves back and sideways away from the lens to return in focusing position.

This design was developed jointly by John Arnold, A.S.C., and the Hollywood Bell and Howell Engineering staff. Cameras of this type are being constructed in Hollywood; seven are in daily use at the Metro-Goldwyn-Mayer Studio; another is owned by the United States Film Service, and seven others are in production. This focusing arrangement may be applied to modernize any existing Bell and Howell, and all new cameras being made are equipped with it.



Photographed by Truman D. Vencill

Making Movies for Colored Audiences

By MACK STENGLER, A.S.C.

WHEN we talk about such artists as Marion Anderson, Paul Robeson, Bill Robinson and Hattie McDaniels, we generally end by paying tribute to the remarkable natural musical and dramatic ability of their race. It is almost traditional that of the thousands of Negroes who have appeared on stage and screen, few, if any, have been known to give bad performances. Almost equally familiar is the intense pride that their fellow Negroes take in the achievement of Afro-American entertainers. A nation-wide audience loyally cheers each success.

The motion picture industry has been surprisingly slow to put these two facts together and give this waiting audience pictures of and for Negroes. From time to time during the past twenty years there have been attempts at making Negro films, here and elsewhere, with varying success. The majority of them have been unsuccessful because their makers seem to have underestimated the colored public, and given them inferior films.

During the last three years, however, the making of colored-cast productions has matured. A better understanding of the production requirements of this field has been coupled with an assured distribution outlet for satisfactorily made pictures. As a result, there are now at least three production units in Hollywood actively engaged in turning out colored-

cast productions of a quality seldom before attempted.

Major Quality

These pictures are being produced on a scale of cost, facilities and schedule that compares favorably with the better independent releases, and the results on the screen are in many cases quite comparable to many major-studio program films.

It has been my good fortune to direct the photography of several of these films. It has been an interesting experience in every way. Photographing negroes, either singly or in groups can offer extremely interesting pictorial possibilities.

It can also offer some equally interesting technical problems. Especially in these films, which deal entirely with modern-day action, tonal rendition is important. The cinematographer should develop an even closer understanding of the relationship between his subjects, his film, lighting, makeup and laboratory processing than would be the case on a similar production using an all-white cast.

I recall some time ago at an A.S.C. meeting devoted to the question of exposure-meters, there was quite a bit of discussion of what should be done when one had a white man and a colored man in the same shot. This is an every-day occurrence in modern all-colored films, for the complexions of the actors vary over the entire



ITS A SAD STORY

Photographed by E. J. Toplitt

range possible from the lightest to the darkest of the negro race.

Know Film, Lighting

The best solution I have as yet found is to know your film and its reaction to varying intensities of lighting. It so happens that all of the colored-cast productions I have photographed have been made on Agfa Supreme negative, with excellent results. Having used this film on other productions with all-white casts, I knew its normal characteristics. This could remain the normal standard for set-lighting and for key-lighting the players with lighter complexions. For those who have darker coloring, I have

simply raised the intensity of the key-lighting, sometimes increasing it by one-third or more.

An important phase of this problem is knowing the shadow-speed of the film you are using. Obviously an emulsion that lacks speed in this region will require more illumination to give a natural rendition of these less reflective darker skins than will a film that has a greater sensitivity in the shadows. Of course, the same applies with equal effect to the matter of modeling.

Makeup is another matter that can easily be misjudged. The average Negro has a skin texture no more

glossy than that of the average white person. But too often cinematographers yield to the temptations of pictorial effectiveness and allow makeup and lighting to combine to give an unnaturally shiny texture to the dusky countenances. To my mind, and I believe also to that of the colored audience as well, a smooth-textured rendition is much more pleasing. Therefore I prefer to have my players made up smoothly, and normally powdered to remove the shine the heat of incandescent lamps gives to colored and white complexions alike.

Of course this is only a generality: there are times when a shiny-faced rendition may be much more effective dramatically. This is especially true when playing for either comedy or melodramatic effects, as I found recently in a colored-cast melodrama where strong rim-lighted effects proved dramatically valuable.

In any photography, securing adequate separation between faces, costumes and sets is a problem. Ordinarily, my experience in filming colored pictures has been that photographically neutral-toned costumes — especially shades of gray — are best. However if one understands his film and its reaction to lighting, even dark-skinned players in light-colored clothes, or lighter players in dark clothes, can be most effective. One of the most effective shots made of the somewhat dark-skinned leading lady in one recent film was one in which she wore a dark-toned evening gown.

Filtering

Regardless of the color of your players, filtering on exterior scenes has always been something to approach with care, especially as the

action progresses from long-shot to close-up. As faces figure more and more prominently, the lightening effect of some filters on face tones becomes more prominent. When your cast is made up of Negroes of varying complexions, this problem may be magnified since the filtering may not act uniformly, but instead may affect the lighter complexions first, while having far less effect on the darker skins. For this reason I have found it best in these pictures to modify my filtering rather more quickly as I move in from long-shots to close angles than I would with an all-white cast.

In general, however, the technical requirements of photographing colored-cast productions do not differ too greatly from those with which we are familiar from experience in filming pictures of more accustomed types. The differences, I believe, can be summed up by the statement that the cinematographer should have complete confidence in the negative stock he uses, and be thoroughly familiar with its behavior under the special conditions of tonal qualities and reflectivity involved.

For the rest, the success of these pioneer Negro producing units is making possible a constant increase in the standard of schedules, budgets and production facilities available. Since this results in a constant improvement in the quality of these films — to the extent that there exists already a probability that from time to time some of them will be regularly booked into representative first-run theatres which have heretofore shown only major "white" productions — it seems that the continued success of good all-colored productions is assured.



RUBBERFINGERS

Photographed by Bob Levy

About Our Contributors

The excellent article on *Make-up for Agfa Film Products* which appears on Page 5 shows clearly that *Max Factor, Jr.*, is carrying on the distinguished traditions of his famous father, whose progressive mind did so much to advance theatrical and screen make-up from a haphazard knack to a science. We sincerely appreciate *Factor's* cooperation in preparing this article for our readers. At the same time we would like to extend our appreciation to the others who participated in the research program out of which the article grew. Among them we may mention *Max Firestein*, *A. Bernard Shore*, Make-up Artist *Sid Kramer*, *Arthur J. Campbell*, Head of *Factor's* Photographic Department, and *Bernice Lyon*, the extremely patient young lady who served as a model for the long series of tests. Incidentally, we hope to publish a similar article on make-up for Agfa Infra-Red negative in a forthcoming issue — especially if the weatherman will cooperate by providing some of the clear, sunny days all of us prefer for testing an outdoor film.

Mack Stengler, A.S.C., whose article on *Making Films for Colored Audiences* appears on Page 28, is one of that rather rare group of cinematographers who seem equally at home directing the photography of a big, major-studio production or a short-schedule independent release. That he is in demand in both fields is high tribute to his technical skill and artistry. We've long known *Mack* as one of the industry's better photographers

of color pictures — and now, from the reviews he is getting on the several all-negro films he has recently photographed, it appears he is also one of the better photographers of colored subjects, as well!

Our frontispiece this month comes from the versatile minicam of *Sergeant Rex Servoss*, of the California Highway Patrol. We think its a rather unusual subject for a photograph, and very well handled photographically. We don't know if *Sgt. Servoss* is one of the State Patrolmen who goes after speeders with a camera, but we'll wager that when he does, he not only gets his man but a better-than-average picture of him too!

Further bows to our friends *Bob Levy* and *Ed Toplitt* for their contributions.

In our Editorial, we mention the many evidences of friendly cooperation between our little journal and the industry's established technical trade papers. The photograph on Page 25 is an example of this. When *W. Wallace Clendenin* reached the point of describing Bell & Howell cameras in his series, *Cameras of Yesteryear*, we found that we needed a picture of a standard Bell & Howell — in a hurry. The cut we use was loaned by the *International Photographer Magazine*, to which we gladly extend credit. Our personal thanks, too, to Editor *Herbert Aller* and Art-Editor *John Hill*, whose excellent filing system made locating a suitable cut a matter of minutes.



Above the Rest

In every field of endeavor, some one individual or product always stands out above the rest . . . in motion picture negative film, *Agfa Supreme* is the outstanding leader. *Supreme* revolutionized cinematography with its combination of high

speed and high quality . . . and today it still offers the supreme combination of speed, balanced color sensitivity, fine grain and tonal brilliance.

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Motion Picture **TOPICS**

MAY - JUNE · 1940



MOTION PICTURE TOPICS

WILLIAM STULL - A. S. C.

EDITOR

Contents

TIMELY TOPICS 2

LOOKING BACK AT TEN YEARS IN EUROPE

By PHIL TANNURA, A.S.C. 5

SUPREME FILMS GRINDING OF 200-INCH LENS

By GLEN EDGERTON 11

AVIATION CAMERA-ARTIST

By WILLIAM STULL, A.S.C. 17

GLACIER LAKE . *Photographed by* LAWRENCE KRONQUIST . *Frontispiece*

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Timely Topics

AT a time like the present, when each headline and broadcast brings its new tale of earth-shaking events, it is only natural that to many of us the production of motion pictures should seem suddenly trivial. But in a larger sense, the exact opposite is true. However strongly we may feel about the events taking place on the other side of the Atlantic, we can do nothing to alter their outcome.

But we have an opportunity to render an invaluable service to the world by swinging the force of our united efforts into the making of better, more entertaining pictures.

The trade papers tell us that a vast part of our foreign market has been blacked out, and that domestic audiences are drastically slashed as thousands of Americans stay home to follow the war news with newspapers and radio. But beyond this, our own reactions as we avidly follow the latest bulletins tell us of a world with nerves racked to the limit. All of us, whether in warring or neutral nations, are living, working and sleeping with our nerves on edge.

Such tension cannot continue indefinitely. Regardless of the outcome of the great events we are following, all of us must sooner or later relax that tension. We will demand something to offset it—to give our frayed nerves a chance to escape from the day's horrible realities.

Motion pictures offer the fullest form of such escape known to our time. It is inevitable, therefore, that

when that tension breaks, whether it is because the dangers causing the tension have abated, or merely because outraged human nature can endure no more, motion picture entertainment will be in greater demand than ever before.

But when that demand comes, it must be met with the kind of pictures that will offer a satisfactory escape for war-frayed nerves. People whose nerves have been rubbed raw by the realities of a world at war will demand entertainment that gives them an utter change of scene and thought. They'll want less of grim and heavy drama, no matter how "timely" or how magnificently produced and acted; they'll want more light and frothy romance, comedy and music. Especially may they be expected to want music-films: showmen of our acquaintance who served overseas during the last war have repeatedly told us that in Paris and London, no matter how the tide of war turned, the music-halls never lacked for packed audiences; in our own country, some of the most successful musicals were produced during our own war years. Human nature doesn't change: the same type of entertainment that offered forgetfulness to war-strained nerves in 1914-18 can repeat in 1940.

Very clearly, it is up to Hollywood to anticipate that need, and to produce the pictures that will satisfy it. Let us hope that the Hollywood which after so many years of bickering over actually pointless questions of internal

organization and jurisdiction, of frittering away time and energy on a score of side-issues unconnected with pictures, having at last found itself truly united in revulsion and resentment over the shocking events of the past few weeks, can maintain that unity and pour it into the making of better, more entertaining pictures to solace the war-ridden nerves of this and other countries. That is Hollywood's chance to prove itself as an agency of world-reaching service.

* * *

DURING the past few weeks, we've enjoyed the pleasure of using some of the "dinky" spotlights recently developed for studio use. While doing so, we couldn't help remarking on the advances in film-speed which have made such tiny lamps practical. Two or three years ago, before the introduction of Agfa Supreme ushered in the day of modern, super-speed films, the idea of using little 150-Watt spotlights for serious professional cinematography would have been out of the question. Such lamps might suffice as playthings for amateur photography, but for any serious professional camerawork they would have been inadequate.

Today they are being used enthusiastically in every studio. We've seen tests in which a good-sized set was entirely illuminated by four or five of these tiny lamps. Another cinematographer told us of having used fifteen of these little lamps as the mainstay of his lighting throughout an entire feature production. In almost every studio there is a continuous minor battle going on between the Directors of Photography and the elec-

trical departments over these lamps; for no matter how many "dinkies" a studio may buy, there never seem to be enough to give each Director of Photography as many of them as he wants!

Incontrovertably these lamps bring the cinematographer a new lighting tool—one that enables him to do things never before possible, when larger, more powerful units were necessary, and one which enables him to achieve more routine tasks with greater ease and efficiency. At the same time, the acceptance of these new lamps has brought business benefits to several manufacturing firms closely allied with the motion picture industry, and welcome employment to their staffs. That's quite an array of achievements for something which only two or three years ago would have been treated as a toy.

Without any intention of taking a bit of credit from the several engineers who conceived and developed these lamps, we'd like to point out that this latest development in lighting equipment has its roots at least indirectly in Agfa Supreme, for only since Supreme revolutionized the industry's conception of film-speeds have such small packages of illumination been of practical value for studio use. We can't help feeling a glow of pride when we realize this is so.

* * *

THREE or four years ago, the cinematographer who used a photoelectric light-meter (except, perhaps, on a few rare location exteriors) ran the risk of being considered either an impractical theorist or a simple crackpot. Today, the cinematographer who

doesn't employ such a device, at least to some extent, finds himself standing virtually alone.

In other words, the modern, photoelectric light-meter has become as much a part of a cinematographer's outfit as his camera and lenses. Everyone has gained from this: the cinematographer gains an added freedom and security; the studio gains even more through the added speed and certainty made possible on the set, and the smoothing out of negative densities for more efficient release printing.

Yet with a single exception, no studio in the industry has seen fit to take the step of providing its cinematographers with these valuable accessories. The camera department of the Twentieth Century-Fox Studio alone has taken the progressive step of providing, standardizing and maintaining light-meters for the use of its Directors of Photography. In all the other studios, the burden of purchasing and maintaining the meters used daily for the studio's benefit has been left on the shoulders of the individual cinematographers.

This hardly seems logical to us. Meters have proven themselves desirable, almost indispensable adjuncts to modern studio cinematography. Their use is of direct benefit to the studio. Why, then, should not the studios provide the meters?

From every viewpoint, there would be much gained by such a policy. If meters are to be used to the fullest advantage, they should be standardized, and they should be maintained

at standard efficiency. These can best be accomplished if the studio provides and maintains the meters. Today there are close to half-a-dozen different types of photoelectric meters used by studio cinematographers. Each presumably is accurate enough when used by its individual owner for his own guidance. But when used as a standard instrument to indicate to the laboratory what has been done, or to second-unit camera crews what should be done, they may not be so accurate. Seventy-five foot-candles on one cinematographer's meter may not agree with an outwardly similar reading taken with a meter of a different type. There is in addition the problem of sudden partial failures of individual instruments, which can cause further confusion.

It has been found, however, that where meters of a single type are provided by the studio, they can be coordinated, given daily routine checks, and maintained at a higher standard of uniformity and efficiency than is possible with individually-owned meters. The value of the meters, both to the cinematographer and to the studio, is thereby proportionably increased. Further, the concentrated purchasing power of a modern major studio can be eloquent in persuading manufacturers to provide instruments embodying special features which may not be necessary in other fields.

So again we would ask, why can't the studios recognize meters as an important part of modern camera equipment, and provide and maintain them, instead of leaving them to chance and to the individual?



THE PAINTER

Photographed by Herbert P. Bond

Looking Back at Ten Years in Europe

By PHIL TANNURA, A.S.C.

SINCE my return to Hollywood activity after spending the better part of ten years in the studios of England and France, so many of my friends have asked me questions about European production methods and conditions that I'm beginning to believe there must be some interest, as well as mere politeness, behind those queries. So I welcome the invitation extended by the Editor to present a few comments on the subject to the readers of MOTION PICTURE TOPICS.

As I complete the photography of the first Hollywood-made film I've

photographed since my return, I'm impressed with the thought that in some ways Hollywood is in advance, and in some ways Europe is ahead: if someone could only combine the best ideas on both sides of the Atlantic, the result would be a very nearly ideal set-up for motion picture production.

As a cinematographer, naturally the first thing I noticed on my return to Hollywood was the difference in the position of the cinematographer here and in Europe. Here in Hollywood, cinematographers are taken



MARCIA

Photographed by Bob Levy

too much for granted — perhaps because Hollywood has such an abundance of outstanding cameramen always available.

In Europe, it is different. There, the cinematographer enjoys a notice-

ably higher professional standing. He is fully as important a figure in making and preparing the production as the director. His opinions and advice are more eagerly sought by all concerned, from the producer down. As

a result he is, I am confident, much more valuable to the production than he is usually allowed to be here in Hollywood.

Cameraman Rates Higher

Ironically enough, I think that the American cinematographers who have made pictures abroad these last eight or ten years are largely responsible for this condition. Europe has many excellent cinematographers, but until the rebirth of European production some ten years ago, they — like the industry as a whole — had had so little activity that they tended as a whole to stagnate. At that time, and especially during the years of England's production boom, Europe's producers saw that the camera was one of the weakest links in their chain. Hence they imported many of Hollywood's best cinematographers, at premium salaries. And as they were paying these experts top money, the European producers were shrewd enough to make the most of it, getting the benefit of the cameraman's wide experience and knowledge of production methods in every possible way.

I believe some few directors and producers here work almost as closely with their cinematographers, but only a few of them. I believe that Hollywood would find a great deal of advantage in following Europe's lead in this respect, especially under the conditions that apply right now, when technical economies are becoming so vitally important.

Europe's studios are now very well equipped. When I first went abroad, that was not the case: but since then Europe's film industry, especially in

England, has had the unique advantage of building itself anew, literally from the ground up. Where we here in Hollywood had a tremendous investment in reasonably efficient silent-picture stages, cameras, lighting equipment and accessories, which could hardly be entirely discarded, Europe's facilities were obviously old and outmoded, and in many cases utterly inadequate for modern sound-film production.

Europe Well Equipped

So Europe found it economical to build new studios, buy new cameras, lamps, and everything else. As a result, the equipment in most of the better European studios is if anything more modern than that generally found here in Hollywood. The cameras are new Mitchell NC's, DeBries and Eclairs — all designed, not merely adapted, for sound use. In most of the best studios, the sound equipment is either ERPI or RCA. The lighting equipment is of the most modern, Fresnel-lensed type, usually of Mole-Richardson manufacture, from M-R's thriving British factory.

The newer British studios themselves compare very favorably with anything in Hollywood. The largest of them — Korda's studio at Denham, which was excellently laid out by American Jack Okey — is even as extensive as all but the very largest of Hollywood plants. The others may be smaller, but they are no less modern.

The French studios are generally smaller and, like our own, more or less conversions of older, silent-picture plants. They compare more closely with Hollywood's middle-sized rental studios. In fact, most of the French studios are operated entirely

as rental lots, servicing the many independent producers that supply the French market. Though small, they are well equipped and staffed.

I was kept so busy in England and France that I had no opportunity to visit the German studios and paid only a brief visit to Italy's much-publicized "Cine Citta." These plants do not compare with those in England.

Metal Set-Platforming

There is one feature of British studio practice which I feel deserves special comment. This is the system, followed in many plants, of using standardized, metal set-platforming.

Instead of using wood for this purpose, standardized tubular metal units and clamps are used. These units are much the same as the metal scaffolding now being used here on big building projects. By using these metal units, considerable savings of time and money can be effected, for the platforming can be put together quickly, conforming more accurately to the shape and height of the set than is possible with wooden platforming, and of course the standardized metal units can be used over and over again.

In addition, it is surprising how Europe's stage crews can improvise accessories with these units. When a company is on location, a parallel of any height can be quickly made from these sturdy tubular units. At other times, I've seen excellent large camera-booms improvised out of the same units. And on one occasion I've known of using this handy framing to hurriedly knock out a camera platform for making low-angle shots of the bow and waterline of a ship

during the short run of a regular cross-channel steamer! I think Hollywood's technicians are missing a good bet if they don't investigate the possibilities of this system.

Laboratories Improved

Traditionally, European laboratory processing has lagged behind Hollywood standards. Such was certainly the case when I first went abroad, but it is not nearly so much the case today. Eleven years ago, the European labs were pretty much on a par with our second-rate labs of pre-talkie days. They generally used rack-and-tank processing, and (like our own labs at the time!) knew nothing of sensitometric methods. Since then, however, the producers, the laboratory owners and the film-manufacturing companies have done a great deal to educate the laboratory technicians in modern methods, and conditions are far better.

In general, I'd say that European negative development is excellent. During these last few years I've seen some of the most beautiful negative work anyone could ever wish come out of the British labs.

Their printing, however, is not so good. No matter what type of film-stock they use, nor how fine a negative they may have to print from, the prints have a tremendous tendency to excessive contrast. I am sure that if you took the same negative, and had one print made from it in the average European lab, and another made in the average Hollywood plant, you would hardly recognize the two prints as being the same picture. In fact, I've seen examples of this, for very often the big first-run theatres in



THE PROJECT

Photographed by Herbert P. Bond

London use American-made prints of Hollywood pictures — using either the master-print that is sent over with the duping lavender, or the lavender itself — while the smaller houses naturally use British-made prints. The difference is incredible, even to one who has seen what he thought were the maximum possible variations in print-quality.

Use Less Light Abroad

There is one phase of European laboratory work that I don't believe has been brought out by anyone before. That is that the European lab's negative development gives you more of the advantage of today's high film speeds. Looking about the various sets here before I started my own picture, I noticed that almost universally my

friends here in Hollywood seemed to be using quite a bit more light than was the rule in Europe.

When I started my first picture, Voco Productions' "Dreaming Out Loud" for RKO release, I found that I was using close to 40 per cent more light than I had been accustomed to using on film of equal speed in England. Of course, if one knows how to balance light, this makes little difference in the result on the screen: but a 40 per cent saving in lighting can be a useful factor in production economy, just the same.

On the other hand, nothing I found in Europe, either in European-made negative or in imported, American-made stock, could equal the Agfa Supreme negative I am using for

"Dreaming Out Loud." This film has a combination of speed, gradation, brilliance and fine-grain quality I've found nowhere else. Nothing like it has been available anywhere in Europe, and I certainly wish I could have used it on some of my pictures there.

Few Process Specialists

There is vastly less photographic specialization abroad. If your picture calls for process-shots, or miniatures, or aerial scenes, you seldom have a specialist to turn them over to: instead, you do them yourself — and like it. Of course, this makes the work technically interesting, and in some cases may be of an artistic advantage. But it would seem less efficient than the Hollywood system of having specialists in these fields to collaborate with you, and sometimes to take complete charge of these scenes while you concentrate your efforts on the straightforward, dramatic portions of the production.

For the same reason, there is very little, if any "second unit" work done abroad.

Another advantage I've found since I've returned was Agfa's Infra-Red negative. This film is not available abroad, and although one or two foreign firms offer emulsions of a somewhat similar type, they do not have the inimitable characteristics of the American product. And yet I think Infra-Red would be of even greater value over there than it is here, for location night-work is very difficult, and often quite impossible in England. Here in Hollywood, when we have such sequences to film, we know we can either take a gas-power-

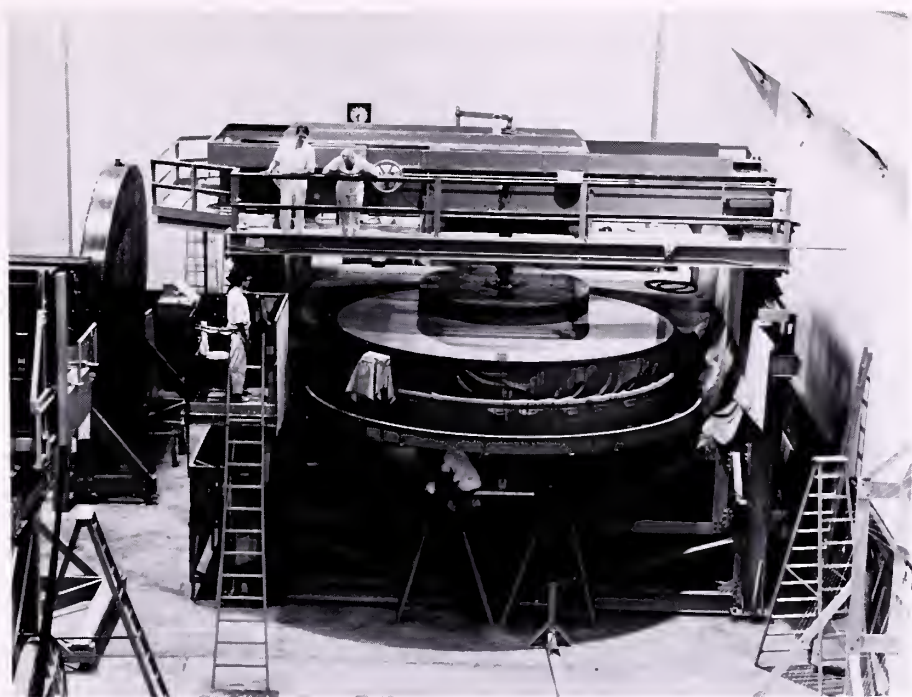
ed generator set, or cut an M-G set into a local transmission-line.

That can't be done in England. There are very few gas generator rigs available there, and most of those that are available are of insufficient capacity for important work. At the same time, it is almost impossible to cut into England's excellent, sprawling network of power-transmission lines (commonly called "the Grid"), as it takes literally months of endless red-tape to gain permission to do so. Infra-Red night effects, if a material equal to Agfa Infra-Red were available, would have been a great advantage to us over there.

Speaking of such special photographic effects, there is one point where I think we in Hollywood might benefit by following England's lead. Over there, when such special camera-effects come up, the director of photography has a more ample opportunity to make advance tests so that he knows precisely how to get the effect he wants; here he is expected to take it in his stride, with perhaps a hand-test to guide him. The Hollywood method saves some time, it is true, and it is a very nice professional compliment to know that we cinematographers are expected to be able to have the complete answer to any technical problem immediately. But

I think most of us would be willing to forego the implied compliment for the greater precision and ultimate efficiency that more ample testing would give us.

So, as I said at the outset, Hollywood and European methods and conditions are not nearly so far apart as one might expect from their geographical separation.



Supreme Films Grinding of 200-Inch Lens

By GLENN EDGERTON

ONE of the greatest engineering projects of our time is being quietly carried out in the shops of the California Institute of Technology in Pasadena. It is the construction of the huge telescope—the largest ever built—for the Mt. Palomar observatory, and the grinding of its great 200-inch reflecting lens. Not only is it the biggest task of its type ever attempted, but it is one requiring incredible mechanical and optical precision. The optical curvature of the 17-foot lens must be perfect within a matter of millionths of an inch—and the mechanical tolerances to which the mirror and its mount are

being built are almost equally precise.

During the last few months it has been my privilege to have been allowed to make an educational motion picture of the grinding of this lens. In making it, I have tried to bring to the classrooms of our schools and colleges a vivid as well as an instructive picture of this most spectacular example of applied optics. Telescope-making on such a scale occurs but seldom—perhaps only once in a generation; and I feel fortunate indeed that the authorities of the California Institute of Technology, who are making the telescope, and of the Rockefeller

Foundation, for whom it is being made, have given me a chance to film the operation.

Big Photographic Problem

Making this film has proven itself a task of no small magnitude. Not only must the subject-matter and its presentation be handled with the utmost scientific accuracy, but the greater part of the camerawork has had to be done under extremely difficult photographic conditions.

To put it bluntly, the great shop that was specially built for this lens-grinding job was not planned with any consideration to the problems of cinematography. As a room for this huge, yet delicate job of lens-making, it is ideal; as a motion picture stage it is quite the reverse. And since making the lens is properly the paramount consideration of all concerned, the cinematographer must necessarily make the best of what is available.

This room is strictly barred to all outsiders—in fact to everyone not directly concerned with the actual work of making the lens. The great enemy is dust: a single grain of dust filtering between the lens and the polishing-tool could easily produce such damaging abrasions in the glass as might take weeks or even months of arduous work to repair.

The room is air-conditioned, of course, and kept as spotlessly neat as any hospital. In addition, everyone entering the room must leave his shoes outside—quite as though he were entering a Japanese temple—and don a special, guaranteed-dustless laboratory coverall. Naturally, only the bare essentials of photographic equipment may be brought into

this sanctus sanctorum—camera, tripod, and perhaps a single photoflood lamp—and even these must be spotlessly dust-free.

Due to the physically great size of this biggest of lens-grinding jobs, the room is big—as large as a good-sized sound-stage. It measures 52½ x 165 feet, and is a clear 40 feet from floor to ceiling.

Use Practical Working-Light

The room is windowless, and all the illumination comes from a battery of 25 incandescent lamps mounted in the ceiling. If you judge the illumination by the standards commonly applied to laboratories or workshops, it is quite adequately illuminated. But if you judge it by photographic standards, the lighting is decidedly inadequate.

The entire illumination of the room is supplied by two groups of lamps: there are 16 lamps of 500 Watts each, arranged along the sides of the room, and a battery of 9 lamps of 1500 Watts each in the center of the room. And all of these lamps are mounted in the ceiling, 40 feet above the floor! As has already been mentioned, I had to make the best of this practical lighting; I could only bring in a single photoflood unit—and that only when it became necessary to light up the heavily-shadowed area directly under the lens-carriage.

By the photographic standards of only a few years ago, the conditions were absolutely impossible for satisfactory motion picture photography. But with today's super-fast emulsions, movie-making might just be possible.

Used 16mm. Supreme

Since the film was ultimately to be



200-INCH LENS

Photographed by Glenn Edgerton

released in 16mm. form, and since compactness and convenience were essential in selecting the camera equipment to be used, I was advised, if possible, to use 16mm. instead of 35mm. Since many release-prints are to be made of the picture, 16mm. negative film, rather than the revers-

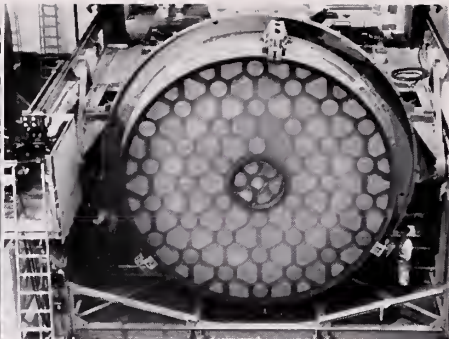
al product, was indicated.

Several unbiased 16mm. experts with whom I consulted all told me that the fastest 16mm. negative film I could obtain was Agfa Supreme 16mm. negative. All of them recommended its use.

Therefore I provided myself with



*Beneath the Carriage of the
200-Inch Lens.*



*The Great 200-Inch Lens
Tilted to Vertical Position.*

a Bell & Howell *Filmo* 70-DA camera, fitted with an $f:1.5$ 15mm. lens, an $f:2.7$ one-inch lens, and an $f:1.5$ two-inch lens, and began making tests with Supreme negative. Since I had been told that a very great range of 16mm. laboratory work was available, ranging from good to bad, with the former none too plentiful, I sent my tests to several laboratories, not only here but in points as far distant as San Diego and New York.

The results were none too promising. Almost without exception they indicated I was not getting enough exposure to give a satisfactory negative. It began to look as though making a movie of the project would be an impossibility. But I resolved on one more test. This, I developed myself, putting through a hand-test in my still darkroom. It was successful. Inevitably, with my crude developing methods, the test-strip was badly scratched, and the grain-size was by no means of the best; but the developed negative revealed ample printing density, and proved that the film definitely had plenty of speed for the job.

Cooperation From Agfa-Ansco Lab.

Armed with this test, I next went

to the Los Angeles Agfa-Ansco laboratory, to see if their experts knew of any lab which could handle my negative. Here I was referred to H. A. Deahoff—and the worst of my troubles were over. From him I learned that this plant, which I, in common with many others, had always thought devoted solely to reversal processing, is now equipped to develop and print 16mm. negative as well.

Too much credit cannot be given Mr. Deahoff and his staff. They have handled all the processing of my picture, and I can truthfully say that without their help, it could never have been filmed. Moreover, they went far out of their way to make my work a success. Deahoff came over to Pasadena with me, and studied the problem thoroughly, then returned to the lab and mixed up a special fine-grain paraphenylene-diamine type developer for my negative. The result is a negative of excellent density, gradation and grain-quality, which is a credit to Agfa Supreme 16mm. negative and to the laboratory behind it.

With this basic problem solved, the rest was largely a matter of deciding what action must be filmed, and shoot-



Grinding this Prism for the 200-Inch Telescope has taken this man four years—And he may finish in four more.



Marcus Brown, Optician in charge of making 200-Inch Lens, with the Foucault Knife-Edge used in testing the big lens.

ing, newsreel-fashion, at the time when that action was happening. This was greatly simplified by the cooperation of my friend Marcus Brown, who is the optician in charge of making the telescope. His advice on the technicalities of telescope-making has been invaluable. He has shown me the things that ought to be filmed, and kept me constantly informed as to when they could be shot. In fact, he has become so interested in picture-making that many times, when I could not be there to operate the camera, he has volunteered to take over the camerawork himself, and has acquitted himself most successfully.

"Clean-Up" Spectacular

Due to the lighting conditions, virtually all of the film has been photographed with wide-open lenses—largely with the $f:1.5$ fifteen millimeter wide-angle objective. The subject-matter is shown in some detail, showing how the grinding tools are prepared with two-inch squares of rouge accurately mounted in the metal tool and fastened in place with hot pitch. Some of these operations are illustrated with simpler scenes show-

ing the same operations being performed on the many smaller lenses, mirrors and prisms being made for the telescope, as well as the spectacular shots of the big lens. In this connection it is interesting to mention that during the four years this work has been going on, approximately 10,000 lbs. of rouge had been used on the big lens alone, and some $5\frac{1}{2}$ tons of glass have been ground away.

It may also be worth mentioning, in view of the frequent newspaper reports that the construction of the mirror is "ahead of schedule," that actually no schedule has ever been set: the work is simply proceeding methodically, and the job will be finished whenever the lens reaches its proper curvature and polish. Time is not a factor; perfection is. And there is no rule or precedent, for each batch of glass, each mould made from each batch, behaves differently in grinding, according to its individual structure.

One of the most spectacular operations is cleaning up the big disc after each day's work. After each session of grinding, the big lens must

be carefully cleaned to permit making tests to determine the progress made.

It is really incredible to one accustomed to treating lenses with the utmost care, to see this clean-up done. The grinding-tool is lifted out of the way. Then the workmen, in coveralls and special soft-soled rubber boots, step down *onto the surface of the lens itself*, and, with a long-handled floor-cleaning mop, spread the rouge uniformly all over the surface. When this is done, a hose is turned on the lens, and the rouge is carefully washed off. Finally, the lens is dried, usually by two or three workmen who tenderly swab it off with big cheesecloth bath-towels. As this is done, the lens is tilted on its carriage, so that the surplus water drains off.

Testing is another interesting operation. After each grinding, the lens (cleaned, of course) is tested visually through a Foucault knife-edge. This instrument gives a visual measure of the smoothness of the surface. It is uncanny to look through it at the surface of the lens which, to the naked eye is already becoming an amazingly perfectly polished piece of glass, and to see that beautifully smooth surface magnified until it seems as rough and pitted as the surface of the moon! Incidentally, when making these tests, the ventilating system in the room must be turned off, for even the gentle movement it produces as the room's air is circulated is enough to make this magnified image dance as though in the midst of a hurricane.

Uses Largest Dolly

For many scenes in our film we used what is probably the largest camera-crane ever used for either 16mm. or 35mm. filming. To handle the vast weight of the lens and the various massive tools, a 50-ton travelling crane moves up and down the middle of the shop. Mounting a little 16mm. camera on this massive crane seemed rather ridiculous at first—but it enabled us to get the most revealing angles, and to position the camera with unusual accuracy.

All told, in slightly over two months of filming, we have exposed over 3,000 feet of 16mm. Supreme negative. We are now in the process of cutting this down to release length—one 100-foot reel. A narrative sound-track will be added to this, and the film will be released through Bell & Howell's 16mm. school-film service in two versions, as a sound film and as a silent. As such, it will be, I believe, one of the first educational films made from the start as a 16mm. negative-film production. Photographically, at least, I feel it will be successful, judging by the appearance of our rushes when, projecting them recently to gain the benefit of Bell & Howell educational film expert Walter Evans' invaluable counsel, we ran the film on Bell & Howell's 12-foot auditorium screen. Thanks to Agfa Supreme negative and to the cooperation of Mr. Deahoff, the picture will also give a most convincing answer to the people who ask whether or not 16mm. negative is practical. It is—when it is Agfa Supreme, backed by the painstaking laboratory service this picture has received.



DC-5

Photographed by Lawrence Kronquist

Aviation Camera-Artist

By WILLIAM STULL, A.S.C.

THE most dramatic newspaper subject in America today is undoubtedly the country's booming aviation industry. At the same time, it is without doubt one of the most maddeningly difficult of modern newspaper subjects—not so much because of the phototechnical problems involved in picturing aircraft in the air and in the factory, but because in most of our leading aircraft plants, with thousands of highly secret planes a-building for our own government and for warring foreign governments as well, the greatest of care must be exercised to avoid the publication of

pictures that might reveal secret features of design or "hush-hush" armaments.

In spite of this—or maybe partly because of it—editors everywhere clamor for pictures and still more pictures of any sort, but especially for pictures that combine the dramatic and pictorial with the newsworthy. Satisfying this demand without at the same time running afoul of three or four sets of strict military censorship is a major headache to officials in most of our leading aircraft plants.

At the huge Douglas factory in Santa Monica—the largest in the

world—a generous share of this problem rests in the lap of smiling young Lawrence Kronquist. Working entirely apart from the firm's two other photographic departments, which make make innumerable straightforward pictures of each plane and its building for purposes of engineering and production record, Kronquist's job is to dramatize with his camera the Douglas plant, its people, and its products, to grace not only the company's advertising, but the pages of such select, hard-to-crash journals as *Fortune*, *Life*, *Saturday Evening Post*, and a host of newspapers and magazines the world over.

Artist and Photographer

For this assignment, Kronquist has unusual qualifications. More than a few photographers of greater or lesser attainments have from time to time chosen to style themselves as "Artist-Photographers." Kronquist would probably disdain to apply the term to himself—but that is precisely what he is: an artist who a few years ago momentarily laid aside brush and pencil for a camera, and discovered that in this modern world the camera, in the proper hands, can often offer artistic possibilities as great or even greater than the older media.

Graduated only a few years ago from Chicago's celebrated Art Institute, Kronquist served a term as staff artist on the *Chicago Tribune*, from which he branched out into commercial art. An assignment to do a series of sketches for the Great Northern Railway supplied his unintended entrance into camera artistry, for when certain of the sketches were to show the line's crack trains at various points on the run, he found it best to sub-

stitute photographs as "sitters" for the actual trains which might whiz past his canvas but twice or thrice a week—and then pass it at fifty or sixty miles per hour.

To get his "model" exactly right, he made the photos himself—and so successful were they that camera-art as well as pencil-art was ultimately included in his railroad assignment!

Picturing Boeing Clippers

Completing this task at Seattle, the Great Northern's western terminus, Kronquist found himself tumbled unexpectedly into the aircraft industry. Boeing was at that time a major center of aviation news-interest, for the first of Pan American's famous transoceanic "clippers" was just being built, and newspapers and magazines were clamoring for pictures. With only a fifteen-foot section of the hull actually completed, supplying this demand for pictures with photographs was manifestly impossible. So, too, would be the use of the engineering staff's strictly technical drawings; and as the Boeing executives soon found out, the average commercial artist is somewhat at a loss when asked to make an accurate, yet dramatic-appearing drawing of a non-existent airplane!

At this stage, Kronquist entered the picture and solved the problem neatly. All of those pictures you saw in the nation's "class" magazines, showing the "clippers," inside and out, long before the first of them left the factory, came from Kronquist's drawing-board. Some even showed the as yet uncompleted "clipper," apparently in flight, spreading its hundred-foot wings over an authentic air-photo of Seattle! The answer, of course, was



WINGS FOR MARS

Photographed by Lawrence Kronquist

that Kronquist's ready pencil superimposed the seaplane (drawn from a scale wind-tunnel model!) over a background photo made by his own camera.

During succeeding months spent with Boeing, as the "clippers" and "stratoliners" were completed and flew, Kronquist's activities turned more

and more away from the graphic and more and more toward the photographic. His stills, at first snapped merely as studies for future sketches, or for the fun of it, had the spark of pictorial drama that editors craved: inevitably they found their way into print.

After many successful months in the northwest, Kronquist hied himself south on a well-earned vacation and honeymoon, and almost before he had begun to give serious thought to establishing new business connections, found himself heading his own, unique pictorial department at Douglas. Here, however, the fame of his skill in making dramatic camera portraits of aircraft had gone before him, and he was engaged primarily as a photographer. Lens and shutter had won — permanently, it appears — over brush and palette!

Varied Activities

Here in the world's largest plane factory, Kronquist's camera activities are many and varied. To put it briefly, he does about everything except make the engineering and record photos which the other two Douglas photo departments attend to with great efficiency. His camera's primary assignment is to produce the arrestingly dramatic shots of Douglas ships on the ground and in the air that lend eye-appeal to the firm's advertising and publicity. Enlargements of these pictures — of salon-print quality — have found honored places on the walls of the offices and homes of important airline executives, civic and military executives, politicians, statesmen and rulers in almost every country on earth. The late King Feisal of Iraq, President Roosevelt, and the aerial warlords of Britain, France, and Norway are among the many who have praised Kronquist's pictorial way with planes. In between-times, he makes portraits of the Douglas executives, many of whom — like so many busy men — are either camera-shy or too busy to bother with having their pic-

tures taken. It's no easy assignment — but Kronquist gets his man, and makes him not only like it, but the resulting picture as well.

Another unique phase of Larry Kronquist's work is his pioneering in the production and use of photo-murals for decorating the cabins of de luxe airliners and private aircraft. "There's more to this than you might think," he tells you. "In an ordinary photo-mural, assuming, of course, that you have a good negative and can turn out an extra-good and extra-large enlargement, you simply mount the picture on the wall, and your job's done.



Flying Photo-murals

"But putting a photo-mural in an airplane cabin is another matter entirely. To begin with, your airplane cabin's walls usually have more or less irregular shapes. That means you've got to plan the composition of your pictures to fit those shapes — especially the upper-corner taper as the fuselage section narrows the wall in with a sweeping inward curve.

"What's more, your mural has to be mounted really *flat* against the wall. A little air-bubble which would be inconsequential in an ordinary mural, is fatal in a flying one. That

air-bubble contains air at the normal, sea-level pressure of 14 lb. per inch: when the plane climbs up into the thinner atmosphere of 10,000 or 20,000 foot altitudes, your innocent little air-bubble will expand almost explosively and rip a big section of the picture loose from the wall!

"Then you've got to consider the constructional problems of aircraft. Naturally, weight is at a premium, so you've got to conserve every fraction of an ounce in your picture and its mounting. Then you run up against the stresses that the wall must stand as the plane flies, and particularly as it lands and takes off. The engineers provide for these by making the wall more or less flexible, so that it flexes — expands and contracts — to adjust itself to these varying strains. Your picture must provide overlaps and what you hope will be invisible expansion joints for the same purpose.

"Then, too, the walls are usually of a peculiar, honeycomb-like porous structure, both to conserve weight and to provide accoustical insulation. You have quite a problem in attaching the moulding that frames your mural.

"Finally, you put your mural in place several weeks before the interior of the ship is finished. And with



DC-4 Landing

streams of workmen going in and out of the ship from then on, installing cabin fittings, instruments, and a host of other things, you can expect one or two clumsy ones will usually manage to gouge a hole or two in your pet picture. Then you try and patch the thing up, working, as the ship is still in the plant, with daylight bulbs and clinging to your favorite rabbit's foot. Sure as shooting, when the ship is at last wheeled out into daylight for delivery, you'll find on looking at the picture by daylight, that you've still repairs to make in your repair-job!"

Agfa All The Way

Kronquist's pictures are an outstanding example of Agfa all the way. His negatives, which are usually exposed in a 3½x4¼ Speed Graphic or a 4x5 Crown View camera, are made on Agfa SSS Pan and Superpan Press cut film, while the prints—generally enlargements from 16x20 up—are made on Agfa Brovira and Cykora papers.

His camera technique is modern, but—"I'm photographically old-fashioned in one respect," he says. "I'm heartily in favor of the idea of standardizing on one really perfect negative material, and one equally per-



DC-5 in Flight



HANGAR NOCTURNE

Photographed by Lawrence Kronquist

fect printing material, and letting your own technical control do the rest. In that way, you know just what you're doing all the time, and there's no guesswork about how will this shot or that print come out: you know if you do your part right, it *will!*

"I've reason to think a lot of Agfa products. Back when Agfa Superpan Press first came out, its revolutionary speed brought me through many photographically tight places, where photographers with old-fashioned, slower films couldn't have gotten a picture. With Agfa's fast film, I got my pictures—and the pictures in turn put me professionally on the map.

"That speed is still vitally important. Shooting pictures, as I often do,

of the operations in the factory has to be done with a minimum of disruption of production. I'll leave it to you to imagine how our own executives (to say nothing of the several foreign military attaches on duty watching us rush out planes for their countries) explode when a photographer suggests setting up a lot of lights and holding up production while he gets the precisely perfect picture. I'll venture to say their remarks would make the remarks of a 'quickie' unit manager faced with a ten-hour delay seem absolutely calm and unemotional! With Superpan Press or SSS Pan and a couple of photofloods or flashbulbs in clamp-on reflectors I can usually 'stop' the motion and get really candid shots of the workers, while production rolls merrily ahead."



WARMING UP

Photographed by Lawrence Kronquist

Fine-Grain Development

Making really big enlargements—16x20 is Kronquist's standard print-size, and for anything special he makes even larger prints—he does something rarely done with 4x5 negatives: he gives them the same type of ultra fine-grain negative development normally given to miniature camera films. "Lots of people," he says, "ask me if it's worthwhile to use fine-grain soup on negatives as large as 4x5. My answer is that maybe it wouldn't be if you were planning on prints only 8x10 or thereabouts, but it makes all the difference in the world if you're aiming for really big prints. After all, blowing up a 4x5 negative to 16x20 is quite a bit of enlargement—enough to magnify any tendency to

graininess in your negative. That's why I've been using so much of the SSS Pan lately. It combines speed, excellent gradation and really remarkable grain-structure in a way that's ideal for my purpose.

"For printing, I've standardized almost completely on Brovira. Especially in the crystal stipple finish, this paper has a unique brilliance that is ideal for aircraft photos. That stipple finish has a sheen that gives an unusually convincing effect to pictures of today's all-metal ships. When this texture is combined with blue toning—a trick I pioneered some time ago, and which is getting increasingly popular with aircraft portraitists—you have the next-best thing to a color-shot.

Flexible Technique

As might be expected from the varied subject-matter involved, Kronquist's technique is flexible. Each shot is its own law. "In general," he says, "I try to deal forcefully with lines and masses, with strong highlights and shadows. I naturally try to keep my definition crisp, but luckily my pictures don't have to conform to the same standards as the more straightforward shots made by the thousands for production and engineering records, and in which the picture is no good unless you can count every rivet on the ship.

"On my exteriors, I try to keep my filtering simple: I usually stick to two filters—one good yellow one, and one good red one. With the latter, I manage everything from normal over-corrected skies to heavy night-effects. However, since we've had Agfa's super-fast films, we've been able to get more and more of our night-effects actually at night.

"The problem of exposure is often complicated by having to shoot fast enough to eliminate the vibration of the plane's engines. This is true even in shots of the ship on the ground, for I'll often have to make my shots while the engines are being tested, or warmed up before test hops. Here, again, no rule can be set down; if the pilot is racing his engine, you have to use a fast exposure; if he's simply idling it, you can shoot far slower.

"Lately I've been exploring the possibilities of composite shots, especially as regards printing in clouds. You know, it seems that every time we get a new ship, like the DC4 or the DC5, ready to take its initial bow, either there are too many clouds for

my picture, or not enough. And clouds make the picture. So I've taken to shooting the ship 'as is,' and printing in the decorative clouds later. When the DC5 came out, for instance, I made my negatives with a blank, 'bald-headed' sky, naturally getting prints indetical with those made by the other cameramen, and useless for our purposes. My superiors wasted no time in telling me so.

Composite Printing

"But I took the negative home to my darkroom, and dug out a nice cloud negative I'd shot up in Seattle, while I was with Boeing. When I returned with the composite print, the 'brass hats' thought I'd been dabbling in black magic, for they couldn't believe it was the same basic picture!

"So I'm trying to build up a library of good background shots. It may sound strange to most of you long-time residents of Southern California, who seem to feel that Southern California clouds are of an inferior variety, and that the clouds up in the northwest are more photogenic, but I've learned from experience that Southern California clouds are far more useful pictorially!

"In making these composites, I've certainly gained a lot of respect for the men in the studios who make projected-background composite shots, for I've learned the vital importance of coordinated perspective and lighting in the background and foreground elements of the shot. If the perspectives of the two elements don't match, your picture, no matter how effective otherwise, stands out clearly as a 'phoney'—and does a nose-dive into the editorial wastebasket. The same picture, with properly coordinated perspective, is almost a cinch to 'click' anywhere."



Photographed by Herbert P. Bond

Flowers That Bloom in the Spring

The flowers that bloom in the Spring have nothing to do with the case . . . except to point out that the success of *any* picture depends on the quality of the negative emulsion used to make it . . . *Agfa Supreme* is the choice of wise cinematographers who know the

importance of getting the best combination of speed, balanced color-sensitivity, grain-size and tonal range.

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